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ABSTRACT

In the first of four sections of this publication, James H. Stone reviews recent writings on the humanities, citing 299 books, essays, and articles. In the second section, Maxwell H. Goldberg provides definitions of several of the central terms related to technological change and human values (e.g., "science," "technology," "cybernetics," "cybernation," and "human values") and discusses the present and future impact of technological change on society. In the third section, an assortment of opinions collected, by Alan J. Trachtenberg and others, as a sampling of contemporary responses to a changing world are presented. Major topics of opinions are "technology as threat or promise," "the pattern of the working day," "the shape of the community," and "the nature of the good life." Concluding the volume is a bibliography of over 90 pages on technological change, human values, and the humanities. General divisions under which items are grouped are "Background and Context," "Impacts and Implications," and "Further Resources." (This document previously announced as ED 036 525.) (LH)

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NEEDLES, BURRS, AND BIBLIOGRAPHIES

STUDY RESOURCES: TECHNOLOGICAL CHANGE, HUMAN VALUES, AND THE HUMANITIES

Developed Largely From the CCLE-IBM Humanities Project on Technological Change

Maxwell H. Goldberg, General Editor
Associate Director, Humanities; CCLE-IBM Humanities Project Director;
Professor of Humanities and English

THE PENNSYLVANIA STATE UNIVERSITY, **Center for Continuing Liberal Education**

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FOREWORD

This book has been long in the making. Its inception goes back to the 1962-63 CCLE-Humanities project on the impact of organizational and institutional bigness on the individual and in terms of human values. It was as a result of one of our University Park consultations on this theme that we were encouraged to shape the proposal that got us committed, in September, 1963, to the CCLE-IBM Humanities Project on Technological Change and Human Values.

The bibliographical compilation begun in connection with our "Bigness Project" flowed into the far more complex and comprehensive bibliography connected with the CCLE-IBM Humanities Project. This, in turn, through the intervening years, has swelled with the rising tides of publications along the broad front of technological change and human values.

In spite of our persistent efforts, to be sure, the bibliographical compilation on technological change, human values and the humanities published in the following pages represents only a portion of the writing--more or less relevant--that has been pouring forth; and, certainly, it leaves a gap between the present and the time when, because of practical pressures, we had to call a halt to further additions. In the intervening period, and at an exponentially accelerating rate, many new writings--again more or less relevant--have contributed to a veritable Noah's flood.

Awareness of this "retrieval gap" is not the only source of uneasiness with the bibliography on "Technological Change, Human Values, and the Humanities" here printed. Another lies in the inadequacies of the scheme of classification, and the recognition that a given item placed in a given category might, with at least equal justification, be placed under another head.

It is with the hope that, both through our own future supplements and through the bibliographical efforts of others--our present compilation will be treated as a basis for much further bibliographic enterprise in this field.

Remarks parallel to those made about the bibliography on technological change and the humanities might well be made, also, about the "Needles and Burrs." This compilation, too, is admittedly far from definitive--let alone exhaustive; and it, too, represents cumulative efforts extended from 1963. A number of hands, furthermore, have contributed to this cumulative venture. To Dr. Alan Trachtenberg, Associate Professor of English at The Pennsylvania State University, and for one year CCLE Staff Associate in the Humanities, both the bibliography and the anthology owe much. In addition, thanks are due to Stephen Knox, John Low, Annette S. Levitt, Patricia Kochanek, Mary Hamel and other staff assistants.

The compilation on "Technological Change, Human Values and the Humanities," is only one of the stockpiles reduced to printed order in this volume. The other, and, indeed, a very impressive one, is that on recent writings on the Humanities generally viewed. For his assemblage of the materials, and for his perceptive analytical and critical treatment of them--we gladly note, here, deep appreciation to Professor James H. Stone. Through his selection of bibliographic items, and, in particular, through his interpretive and critical observations, he has made a substantial contribution to another among the central concerns of the Humanities component of the Center for Continuing Liberal Education. This is the interdisciplinary humanities movement in the schools and colleges. It is confidently hoped that this portion of the present volume will prove a particularly welcome resource for all concerned with this movement.

Finally, a word concerning "Cybernation, Human Values and Education." I have included it here because, in my opinion, it provides useful definitions of several of the central terms closely related to the whole matter of technological change and human values--especially the terms science, technology, cybernetics, cybernation, and human values, itself.

In conclusion, much more than a word of thanks is due Dr. Cyril F. Hager, Associate Dean, College of the Liberal Arts, and Director of the Center for Continuing Liberal Education. Dean Hager's understanding of the tricky and sticky nature of bibliographic compilation and his patience with the slow pace of this admittedly unspectacular task have reduced--if not the actual difficulties, then at least the angst, endemic to work of this sort.

A REVIEW OF RECENT WRITINGS ON THE HUMANITIES: A CRITICAL AND BIBLIOGRAPHICAL STUDY

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"Given the magnitude of the task [of humanistic scholarship] and the impossibility of total perfection, the humanist scholar must, of course, specialize and his works will often be esoteric. But the belief persists that somehow specialization must be converted to generalization if the humanist scholar is to complete his job. Humanist scholars have not solved the problems of excessive specialization and must share the blame for that catastrophe of communication which besets modern learning." So writes Richard Schlatter, in his prefaces to the admirable Princeton Studies in Humanities, of which he has been general editor.[1] The several volumes of the Studies illustrate his rueful comment. They treat the humanistic subjects separately, and the theme of specialization is dominant in their accounts of humanistic scholarship, education, and opinion in the United States.

It is obvious, indeed, that this generation's hope for synthesis and integration has been rather less than triumphant. But it has not been insignificant, nor has it failed to develop professional status. Integrational humanities enterprises persist at all levels of higher education, from general studies to the doctorate.[2] And over the years there has appeared a sizable body of writing about the humanities, generally or synoptically perceived. We await assessments of the progress and value of efforts to "solve the problems of excessive specialization" by research and teaching. Reports on integrated and interdisciplinary research programs, instruction, and curricula are most immediately required. Meanwhile, however, it may be of some avail to present the results of a survey of recent American literature about the humanities.

The survey was undertaken to identify the trends and estimate the vigor of the general humanities movement of the last two decades.[3] In addition, it was needed as a bibliographical guide for students taking the Master of Arts degree in the integrated humanities program of San Francisco State College. While relevant materials appeared in a variety of general and scholarly periodicals, such sources as The Journal of Higher Education, The Journal of General Education, The Journal of Aesthetics and Art Criticism, and Daedalus were especially useful. The sample is thought to be reasonably representative through 1965-66, although it is by no means exhaustive. It should be expanded especially to include European sources. A few works are included simply because of their prominence and familiarity in the context of integrative studies. Others reflect the status of the general humanities movement rather by contrast with it than by support of it. The report first summarizes the principal aspects of this sample of writings on the humanities. Then, the bibliography itself is listed and annotated by a simple set of symbols.

In general, discourse on integrative and interdisciplinary humanistic study is still in its infancy, despite the warmth which often marks the arguments of its advocates. For analytic purposes, we can discern the following subdivisions of the discussion: (1) definitions and defenses of the humanities; (2) statements regarding the propriety and general character of integrational studies; (3) discussions of the relations between the sciences and the humanities; (4) theoretical designs for integration; (5) descriptions of interdisciplinary or integrative courses and programs of instruction in the humanities; and (6) notices of integrative tendencies within or between specialized humanistic disciplines.

Definitions. For almost all writers, "the humanities" means several separate fields of learning and expression: literature and the fine arts, philosophy and religion, history. Although these fields are distinguished, it is commonly--almost platitudinously--declared that they act together to preserve the most admirable aspects of human culture; to present and foster the most desirable of man's attributes; to depict and exemplify the most praiseworthy traits of man's character, action, hope, and belief--in a word, his values. The humanities, in addition, take particular notice of the individual and emphasize whatever is unique in human experience. Too, they cherish man's emotional as well as his rational commitments. These various traits are usually thought to be significant in differentiating the humanities from other means of learning and teaching. The rhetoric of such statements retains the flavor, if not the discipline, of the idealist tradition in Western thought.

Writers often describe the humanities in terms of essential and constant characteristics. For some, the common denominator is an historical assessment of man's actions; for some, a philosophical idea about man's nature; for some, an aesthetic regard for man's works. A few suggest less conventional unifying terms: modes of expressive power (10); significant non-operational content of behavior (217); emotional quanta and manifestations of personality (J. Katz and N. Sanford, 63; 100); the sources of a "condition of freedom" (249). Occasionally, misgivings are expressed regarding orthodox ways of describing the humanities (97, 112, 174, 177, 179, 192, 243, 281). But most writers offer their definitions with an air of confidence and devotion, as if to correct careless misunderstanding or redress unjust deprecation of the humanities.

Integration. Even comprehensive statements on the humanities give relatively little attention to integration. As we have already observed, it is not a major concern of contributors to the *Princeton Studies in Humanities* (2, 13, 16, 31, 35, 36, 43, 59, 75, 78). Nor is it treated conscientiously by the Commission on the Humanities in its influential *Report* where, if anywhere, one might suppose it would be noticed (15, 42); however, a few of the learned societies represented in the *Report* announce integrative or interdisciplinary obligations, (e.g., American Studies, Renaissance, Metaphysics, Aesthetics, etc.). Many writers only allude to the integration of the humanities while denouncing specialization. However, some (e.g., 42, 298) consider the possibilities of wholesome relations between specialization and generalization, or the necessity for both analysis and synthesis in the humanistic enterprise (e.g., 41, 42, 66, 67, 68, 163, 182, 298). A few declare that integrative knowledge is *the* vital goal of the humanities or that it is essential to produce their most valuable effects (79, 170, 201, 225, 242).

The ingredients of integrated learning are more often named than discussed: facts and values; instrumental means and transcendent goals; intelligence and emotion; learning and life; ideas and experience; past and present. Some commentators identify the principal fields of study which are candidates for integrative treatment. Philosophy and history, literature and the nonverbal arts are the most commonly-suggested combinations. Others surmise that one of the major humanistic subjects properly conceived can provide an integrational domicile for all the humanities. The comprehensive possibilities of a literary, an historical, an aesthetic, or a philosophic outlook are, of course, well known. A few writers suggest that integration is not necessarily associated with any particular field of study. Rather, it is an attribute of a mind suitably trained and stimulated, or it is an educative and scholarly strategy (7, 11, 20, 64, 72, 163, 213, 238, 243). There are certain unifying concepts, some say, which serve as integrative touchstones (11, 86, 104, 111, 120, 152, 211, 214, 218, 247, 248).

The sciences and the humanities. Sir C. P. Snow's celebrated lecture on "The Two Cultures" (1959) may be thought of as a particularly imposing, but by no means atypical, contribution to the long-continued debate on how the sciences and the humanities are related in modern times. Much that humanists continue to say on the matter still evinces skepticism about the alleged claims of science to preeminence in the study of man. Too, recent writers often say that the supposed indifference of science to the humanities has helped breed technological materialism and other social and moral conditions which humanists deplore. Some aver that science is merely pretentious if it is not grounded on or pursued within humanistic knowledge and value systems. Indeed, it is suggested, the sciences are effective only when practiced by minds trained by the humanities to seek truth and love freedom--or even to know what truth and freedom are. Yet there are those who deem it absolutely necessary and entirely possible for the sciences and the humanities to exist in some organic, complementary, or integrative relationship. To do so, such writers think, specialization must be less emphasized and there must be greater recognition of common features of scientific and humanistic epistemology, methodology, interests, and goals. With respect to the natural sciences, the humanities appear to be involved in the very nature of cognitive processes, as well as at the upper limits of scientific ends and values. With respect to the social sciences, the humanities are said by some to be both beneficiaries and benefactors, gaining knowledge of human behavior and contributing knowledge of man's qualitative and creative nature (13, 37, 55, 94, 111. 115, 122, 131, 145, 148, 170, 175, 198, 226, 259).

Theories of integration. Although early writers on general humanities foresaw the need for theories of integration (7, 64), or offered them forthwith (39), the demand for theory is relatively infrequent in recent writings (159, 175, 182, 245). Some who discuss integration evidently feel that the way is sufficiently clear to those who have the will. Occasionally, fear is expressed that there will be a premature or rigid codification of integrational conceptions (e.g., 270). However, essays in theoretical formulation do appear from time to time, and notable examples of the operation of theoretical systems can be cited (e.g., 4, 9, 34, 46, 50, 56, are a few of the seminal works that seem to agitate or inspire contemporary students of general humanities). A number of theoretical statements emphasize the integrational relationships between the knower and the known, accounting for their inseparability in existential, positivistic, psycho-social, semantic, or realistic terms (10, 12, 51, 55, 61, 100, 149, 156, 163, 173, 184, 206, 241). Others approach integration by way of certain definitions of the nature of knowledge or the configuration of knowledge-systems (11, 12, 23, 26, 57, 86, 104, 109, 122, 150, 152, 196, 207, 213, 214, 217, 234, 247, 288). Theodore M. Greene and Howard Mumford Jones have been distinguished spokesmen for the theoretical and practical integrating effectiveness of history, literature, and philosophy. Interesting theoretical proposals are suggested, also, with reference to the study of values (121), the total nature of objects (evidence, monuments) (96, 199, 247), themes or interpretations of human experience (47, 136), culture and social character (49, 160, 211, 239, 277), or the demands presented by selective studies of man in society (137, 222, 268). Comparable theoretical inquiries are reported for the social sciences (280).

Education. During the past several decades, much writing on the humanities has lamented their apparent decline and patronage in education. It occurs to some to think that the humanities themselves display the overspecialization and analytic bias which (it is said) have reduced the liberal arts to the unenviable role of competitor with the practical and technological vocations (e.g., 15, 38, 41, 97, 121, 177, 243). Thus, before and since the encouraging Harvard Report on General Education (32), spokesmen of the general humanities movement have recommended it both as a means of improving humanistic education and as an embodiment of humanistic educational goals--perspective, the integration of knowledge, and the synthesis of values with thought and experience. This movement apparently has not seemed to be masterful to some notable observers [e.g., 15, 42; or Russell Thomas, The Search for a Common Learning: General Education, 1800-1960 (New York, McGraw Hill Book Co., Inc., 1962), pp. 97-99]. However, the literature on the humanities includes a number of comprehensive surveys of the interdisciplinary or integrative movement in education (e.g., 1, 7, 20, 21, 48, 54, 76), discussions of the common types of general humanities courses (103, 107, 133, 141, 144, 212, 220, 221), and reports on specific courses or programs (3, 7, 17, 19, 20, 21, 26, 48, 72, 76, 89, 98, 99, 158, 194, 274, 278). From such writings it may be inferred that the prevailing modes of integrational thought are inclined to be literary and historical, on the one hand, or aesthetic and formal, on the other. In recent years, it appears that the two approaches are often blended in conceptions of cultural history which emphasize selected "masterworks," rather than survey an accumulation of fragmentary "examples"; by studies of aesthetic form which develop linear perspective (e.g., in concepts of style) or which are connected up with the personal and social interests of the contemporary student; or by consideration of themes and issues which have both past and and present manifestations. In the more extensive general humanities curricula the interdisciplinary effort appears usually to combine specialized study in one subject with samples from several others or (less frequently) with occasional courses wherein interrelationships and the processes of synthesis are expressly treated (54).

Integrative tendencies in the humanistic disciplines. Scholarship and higher education today, after all, are extremely specialized. Perhaps it is predictable, then, that integrative thought and study will be a byproduct of intradisciplinary activity rather than--as once was the case--the source of particularization and nominalistic research. In any case, integrational and interdisciplinary developments within the subdivisions of the humanities are revealed by recent writings on the humanities generally considered.

a. The Fine Arts. With respect to the fine arts, one not only finds recent writers who praise the unique values or supreme unifying power of aesthetic form and appreciation (104, 138, 230, 282), but also those who emphasize the relationship of creative expression to other major forms of individual and social experience (2, 15, 20, 26, 46, 49, 60, 61, 64, 91, 124, 130, 143, 151, 167, 177, 196, 223, 296. See 179 for a rather wry account of the "wedding" which gave a name to the recent offspring of congressional cultural paternalism, the National Foundation on the Arts and the Humanities). Concepts, methods, or demonstrations of integration involve, of course, the relations between verbal and nonverbal cognition and expression (2, 23, 26, 27, 46, 57, 85, 90, 156, 157, 161, 167, 198, 199, 201, 220, 271, 285, 290); the relationships among the several non-verbal arts (e.g., 27, 52, 231, 265, 272); and the interactions between the arts and communication media, on the one hand, and the total flow of psychic and social experience, on the other (e.g., 11, 49, 69, 91, 143). These approaches lead to particular instances of integrational scholarship (e.g., the work of Panofsky, Hauser, Clark, Mumford, Read, and others), and to various interdisciplinary or integrative college and high school courses (see examples marked "E" and/or "A" in the listing which follows). The special problem which music seems to present is not unnoticed (31, 130, 164, 169, 262).

b. History. The historians' perennial engagement with theoretical problems continues (e.g., 35, 66, 67, 68. Note, also, the recent establishment of the journal, History and Theory; and the pronouncement of the American Historical Association in 15, below). Historical generalization and interdisciplinary study commonly involve the social sciences in contemporary literature. However, even in this connection, relations to the humanities may be emerging insofar as the behavioral studies themselves admit room for the arts, ideas, and psychology of man. The synthesizing role of history (153, 208), the derivation of its theories from philosophic systems, or its symbiotic relationship to literature or the arts receive attention in recent writing (102, 153, 179, 180, 190, 209; the work of Barzun, T. M. Greene, H. M. Jones, et.al.). The present survey may especially need supplemental attention to recent trends in the philosophy of history, and to the practices of intellectual and social historians.

c. Literature. The prominence of literary materials and criticism persists in general humanities teaching (see comment above on 'Education'). Literary scholarship itself, however, appears to be still struggling with questions regarding the relationship of literature to history, philosophy, and the other arts; and to some of the social, moral, and psychic goals elsewhere said to be appropriate for the humanities (16, 42, 75). Confidence is expressed in the great (if not supreme) effectiveness of literature in integrated humanistic education and as a universal humanistic form (29, 64, 88, 119, 124, 129, 142, 261, 292). It appears that earlier irregular, though ingenious, bridges between literary criticism, anthropology, sociology, and psychology now carry increased traffic. Linguistics and communications theory, at one extreme, and sophisticated concepts of social dynamics or historical change, at the other, suggest still other opportunities for interdisciplinary effort. Exemplary attempts to depict an integrational context wherein literature functions synoptically as well as differentially can be cited (e.g., 11, 47, 155, 291).

d. Philosophy. Philosophy seems to be the most self-consciously autonomous of the humanistic disciplines, at present. The organized metaphysicians and aestheticians are exceptions in expressing interdisciplinary interest (15). Some writers take the position that philosophic inquiry is itself the master humanistic enterprise, or that its skills of criticism, employed according to professional canons rather than adulterated by the habits and opinions of amateurs, should compose the principal part of a humanistic education. Others desire to see a functioning federation, if not a union, of philosophy and the other humanities (39, 45, 51, 101, 150, 240, 266, 299, e.g.). But the integrative outlook of such writers as Cassirer, McKeon, Greene, Lamont, Langer, Northrup, Maritain, and Pepper, and the generous appreciation of philosophic learning shown by Greene and Jones, appear unusual, in recent writing. Professional philosophers are not numerous among those discussing general education (see above, "Education," and 103, 139). As for religion, however, the situation is reversed. In respect to the academic environment, as well as with regard to theology, ethics, and institutional affairs, the interrelationship of religion with the other humanities (as well as with the sciences) is much noticed (e.g., 18, 36, 59, 113, 166, 185, 244, 267).

Full justice probably cannot be given to the interdisciplinary or integrative factors in the special disciplines except by more extensive bibliographical studies than the present survey provides. Superficially considered, such integrative scholarship is not prominent or decisive. But to say so much is not to deny the interest and possibly ultimate influence of exceptional cases. From the standpoint of some writers on the humanities generally conceived, there would appear grounds for mild optimism about progress toward integration within, as well as beyond, the disciplines (42, 73). It remains to be seen in the later 1960's whether this hope will be realized, or whether the forces of institutional specialization will continue to outpull efforts to develop integrative theory and practice.

* * * * *

Recent Books, Essays, and Articles Regarding the Humanities

Note on annotation and abbreviations. Marginal symbols indicate the approximate bearing which each work (or parts and passages thereof) has to general humanities and to integrational problems in the humanities. The symbols A (fine arts), E (education), H (history), L (literature), and PR (philosophy or religion) signify that the author writes from the standpoint of the designated field but is in some way interested in its relationship to others. The symbols NSH and SSH indicate the author's interest in the relationships to the humanities of the natural sciences or the social sciences. Textbooks or anthologies exemplifying educational approaches to general humanities are identified by the letter T. Works which contain definitions, general descriptions, or defenses of the humanities, but are not essentially concerned with integration or with theories of integration are identified by the symbol D. Those which take up the question of integration overtly (and which therefore also provide definitions) are marked by the letter I. Works venturing into general theory (GT) can be assumed also to contain definitions and remarks regarding integration. In short, the symbols D, I, and GT designate works of major interest in regard to general humanities.

I/E	1. -------. *General Education in School and College* (Cambridge, Mass., Harvard University Press, 1953)
GT/SSH/A	2. Ackerman, James S. and Rhys Carpenter. *Art and Archaeology* (Englewood Cliffs, N.J., Prentice-Hall, Inc., 1963)
E	3. American Council on Education, Cooperative Study in General Education. *Proceedings of the Workshop in General Education. Volume II: Humanities* (Chicago, American Council on Education, 1941)
I/L	4. Auerbach, Erich. *Mimesis* (Princeton, N.J., Princeton University Press, 1953)
I	5. Barzun, Jacques. *Teacher in America* (Boston, Little, Brown, and Co., 1945)

E	6. Baskin, Samuel, ed. Higher Education: Some Newer Developments (New York, McGraw-Hill Book Co., 1965)
GT/E	7. Beesley, Patricia. The Revival of the Humanities in American Education (New York, Columbia University Press, 1940)
D/I	8. Boewe, Charles E. and Roy F. Nichols. Both Human and Humane. The Humanities and Social Sciences in Graduate Education (Philadelphia, University of Pennsylvania Press, 1960)
I/L	9. Burke, Kenneth. Attitudes Toward History (New York, New Republic, 1937)
GT	10. Cassirer, Ernst. An Essay on Man (New Haven, Yale University Press, 1944)
GT	11. Cassirer, Ernst. The Logic of the Humanities (New Haven, Yale University Press, 1961)
GT	12. Chambers, Frank P. Perception, Understanding, and Society. A Philosophical Essay on the Arts and Sciences and on Humane Studies (London, Sidgwick and Jackson, 1961)
PR/NSH	13. Chisholm, Roderick M., and others. Philosophy (Englewood Cliffs, N.J., Prentice-Hall, Inc., 1964)
GT	14. Cohen, Arthur A., ed. Humanistic Education and Western Civilization (New York, Holt, Rinehart and Winston, 1964)
GT	15. Commission on the Humanities. Report of the Commission on the Humanities (New York, American Council of Learned Societies, 1964)
I/L	16. Daiches, David. English Literature (Englewood Cliffs, N.J., Prentice-Hall, Inc., 1964)
T/I/E	17. Davidson, Robert F., and others, eds. The Humanities in Contemporary Life, (New York, Henry Holt and Co., Inc., 1960)
GT/PR	18. Dawson, Christopher H. The Crisis of Western Education (New York, Sheed and Ward, 1961)
T/I/A/E	19. Dudley, Louise and Austin Faricy. The Humanities (3rd ed., New York, McGraw-Hill Book Co., Inc., 1960)
I/E/A	20. Dunkel, Harold B. General Education in the Humanities (Washington D.C., American Council on Education, 1947)

I/E 21. Fisher, James A. The Humanities in General Education (Dubuque, Iowa, Wm. C. Brown Company Publishers, 1960)

GT 22. Fishwick, Marshall W., ed. American Studies in Transition (Philadelphia, University of Pennsylvania Press, 1964)

T/GT/A 23. Fleming, William. Arts and Ideas (New York, Henry Holt and Co., 1955)

I/NSH 24. Foerster, Norman, ed. The Humanities After the War (Princeton, N.J., Princeton University Press, 1944)

I/E 25. French, Sidney J. Accent on Teaching. Experiments in General Education (New York, Harper and Brothers, 1954)

GT/A/E 26. Graeffe, Arnold D. Creative Education in the Humanities (New York, Harper and Brothers, 1951)

I/A 27. Greene, Theodore M. The Arts and the Art of Criticism (Princeton, N.J., Princeton University Press, 1940, 1947)

GT 28. Greene, Theodore M., ed. The Meaning of the Humanities (Princeton, N.J., Princeton University Press, 1940)

I 29. Hadas, Moses, Old Wine, New Bottles. A Humanist Teacher at Work (New York, Simon and Schuster, 1962)

I 30. Harris, Julian, ed. The Humanities. An Appraisal (Madison, Wisconsin, University of Wisconsin Press) 1950, 1962)

A 31. Harrison, Frank L., and others. Musicology Englewood Cliffs, N.J., Prentice-Hall, Inc., 1963)

I/E 32. Harvard University. General Education in a Free Society (Cambridge, Mass., Harvard University Press, 1945, 1955)

GT/A 33. Hauser, Arnold. The Philosophy of Art History (New York, Alfred A. Knopf, 1959)

GT/A 34. Hauser, Arnold. The Social History of Art (New York, Alfred A. Knopf, 1951)

I/H 35. Higham, John, and others. History (Englewood Cliffs, N.J., Prentice-Hall, Inc., 1965)

I/PR/E 36. Holbrook, Clyde A. Religion, a Humanistic Field (Englewood Cliffs, N.J., Prentice-Hall, Inc., 1963)

GT/NSH	37. Holton, Gerald, ed. *Science and the Modern Mind* (Boston, Beacon Press, 1958)
D/E	38. Hook, Sidney. *Education for the Modern Man* (New York, Alfred A. Knopf, 1946, 1963)
GT/E	39. Hutchins, Robert M. *The Higher Learning in America* (New Haven, Yale University Press, 1936, 1952)
D/E	40. Jacob, Philip E. *Changing Values in College* (New York, Harper and Brothers, 1957)
I	41. Jones, Howard M. *American Humanism* (New York, Harper and Brothers, 1957)
I	42. Jones, Howard M. *One Great Society. Humane Learning in the United States* (New York, Harcourt, Brace and Co., 1959)
E	43. Knapp, Robert H. *The Origins of American Humanistic Scholars* (Englewood Cliffs, N.J., Prentice-Hall, Inc., 1964)
GT	44. Kwiat, Joseph J. and Mary C. Turpie. *Studies in American Culture* (Minneapolis, Minn., University of Minnesota Press, 1960)
I/PR	45. Lamont, Corliss. *Humanism as a Philosophy* (New York, Philosophical Library, 1949)
GT	46. Langer, Susanne K. *Philosophy in a New Key* (Cambridge, Mass., Harvard University Press, 1942, 1957)
GT/L	47. Levi, Albert W. *Literature, Philosophy, and the Imagination* (Bloomington, Ind., Indiana University Press, 1962)
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Note on abbreviations. The following abbreviations are used for the titles of journals.

AHR	American Historical Review
AQ	American Quarterly
AS	American Scholar
ASR	American Sociological Review
ASt	American Studies
At	Atlantic
BAS	Bulletin of the Atomic Scientists
CAJ	College Arts Journal
Da	Daêdalus (Proceedings of the American Academy of Arts and Sciences
DAb	Dissertation Abstracts
Dio	Diogenes
EL	Educational Leadership
ER	Educational Record
Ha	Harpers
ICUT	Improving College and University Teaching
JAAC	Journal of Aesthetics and Art Criticism
JGE	Journal of General Education
JHE	Journal of Higher Education
JHI	Journal of the History of Ideas
JP	Journal of Philosophy
JR	Julliard Review
KR	Key Reporter
MEJ	Music Educator's Journal
Na	Nature
Sc	Science
Sp	Speculum
SS	School and Society
TCR	Teachers College Record
VQ	Virginia Quarterly

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CYBERNATION, HUMAN VALUES AND EDUCATION

Maxwell H. Goldberg

(Revised version of Lecture Presented November 4, 1964, at York-Suburban Junior-Senior High School, York, Pennsylvania to Faculty and Guests, Mr. T. W. McMillen, Principal, Presiding)

MR. T.W. MCMILLEN: We are to listen, this afternoon, to a story that, I think, is going to be most interesting. The gentleman who is with us today is from the staff at The Pennsylvania State University. He is Associate Director, for the Humanities, of the Center for Continuing Liberal Education, in the College of the Liberal Arts. He is Professor of Humanities and English; and is also Director of the CCLE-IBM Humanities Project on Technological Change and Human Values. As such, he developed, among other programs, two major gatherings that were held at University Park in December of last year and in June of this year. The first was a conference of academic and lay leaders on the theme of "Technological Change and Human Values." The second was a seminar on the theme of "Work, Leisure and Education in a Changing Industrialized Democracy."

The subject on which our guest is going to speak this afternoon has in it a term with which I do not think he is too pleased, but which he has accepted--namely, cybernation. I trust he is going to explain about cybernetics and cybernation, so that, by the end of the afternoon, we will at least know what these terms mean. He has agreed to speak on the subject "Cybernation, Education, and Human Values." Now I am going to ask him to come forward, if he will, and try on this superb microphone for size. Dr. Maxwell H. Goldberg.

DR. GOLDBERG: Thank you very much, Mr. McMillen. It is a real pleasure to be here. It is quite fine to see here some of the further-range results of our efforts which hitherto have been centralized largely at the University Park campus of The Pennsylvania State University. It is good to see people become so interested in a given issue of personal and public responsibility that they wish to carry those discussions further, to set up on-going conversations in their home community. It also is pleasing to have a chance to share with you this afternoon a few of my own experiences as I have been trying to plot a path through a veritable jungle. I mean the jungle of fresh developments that have been signalled by the title you have given to my talk this afternoon--"Cybernation, Human Values, and Education."

There is a matter of a term here that I must address myself to, the term cybernation. But before I do that, I would like to review several terms other than cybernation, that are bound to come up.

The first of these is the ubiquitous term "science" itself. I use the term this afternoon in its more modern sense rather than its older, more comprehensive or generic sense. This may be seen by recalling the etymology of science--from the very broad-ranging Latin scire - "to know." According to this derivation, the older meaning of science, in modern as in ancient times, suggested any systematic, organized field of disciplined study and inquiry that commanded scholarly enterprise and respect. According to this line of meaning, the study of languages, the study of literature or history or philosophy--each of these could be legitimately called a "science," and each of these was called a "science." (Compare the German term Wissenschaft.)

Just a little over a hundred years ago, in his great Dublin lectures on The Idea of A University, John Henry Newman, later to become a cardinal, still used the term science in its older generic sense. Already, however, certain new, much more limited uses were being made of the term science. More and more specifically, the term was coming to be used to designate what, since the Seventeenth Century, had begun to be referred to as "The New Philosophy" or "The New

Sciences"--such as, physics and chemistry--both of these deriving from the older "Natural Philosophy." Then, in the Nineteenth Century, the term science, still quite specifically, was applied to the newer biological studies; then to the emerging psychological studies and social studies (now called, in combination, "the behavioral-social sciences"), deriving, historically, in considerable part from the older "Moral Philosophy." Hence, nowadays, unless indication is given to the contrary, it is this complex of physical and biological and behavioral-social disciplines to which, collectively, the term science is given.

Then we have the word technology. This we must consider. For, if we are to speak of cybernation, we must recognize it as designating a more specific aspect of the much more inclusive phenomenon called technological change. It is this technological change which is so pervasive, and which commands our urgent attention as educators. This handsome structure in which we are gathered together, with its vast array of complex equipment, complexly interrelated, is just one of the examples of how deeply enmeshed we are in the cunning and far-flung webs of technological change. Through this microphone I wear, I am actually collared--or yoked--by this complex of advanced technological change.

Now technological is the adjectival form of the noun technology, and to this word let us turn. Etymologically, we have a Greek word technic, which means "an art," "an artifact," "a systematic practice." This goes back to an Indo-European root tekth which means "to build." In the Greek we have an example in the word tecton which means "a carpenter," and in the Latin, texerere, which means "to weave" or "to build," and also in the Latin, tectus, which means "a shield," "a roof,"--that is, something that has been built as a covering. (Cf. the modern English word texture).

You will notice, here, a common feature, which links these later terms with the Indo-European root-term tekth. There is the suggestion of practical application. There is the suggestion of that which belongs to the realm of action rather than to the realm of contemplation or speculation or theory. In so far as thinking is involved, it is pragmatic, operational thinking that has to do with making plans and then translating them, through physical exertions, into visible, tangible things--actions and things.

Tech suggests, then, what is practical; it suggests what is applied; and it suggests the ways in which man's brain power develops tools to augment and to make more subtle the brawn power that he has to begin with. To strengthen, to refine his brain power, we have techniques. Technology, of course, is a systematic treatment of this whole realm of human effort. It is the science or the study of practical arts. It is a systematic study of techniques.

Technology also means "applied science." This, of course, is why I brought the word science in at the beginning. For some of my friends say: "Max, really what you're talking about is science: "Scientific Change, Human Values and the Impact on the Individual." And I simply reply, "Well, if you want to see it that way, all right." But it's science in its more applicative aspects that we are concerned about. It is science applied to various kinds of practice--not purely theoretic or speculative science, and this makes a vast difference in my approach and my intention.

Generally, nowadays, the term technology has been broadened to include various phenomena--social phenomena, communal phenomena, managerial phenomena,--wherever you witness the mobilization of various instrumentalities including committees, commissions and the like, to achieve practical ends. It becomes almost a figurative use of the word when you apply the term technology that way. Nevertheless, it is an increasingly frequent use and an increasingly legitimized use of the term, especially since so many technologists in the more conventional sense of the word have now taken to the study of the behavioral-social sciences; and the hybrid term "social engineering" has been appearing more and more frequently.

When we speak of technological change and cybernation, there are several points that need, at the outset, to be stressed. One point I have noticed increasingly within the last year or two. There is an increasing insistence that we no longer limit ourselves almost exclusively to technological change as a matter largely of the application of physics and chemistry, and of electronics. We now include the whole field of "applied science." We increasingly take into account some of the highly advanced investigations and applications in the realm of the biological studies. There is the whole matter of what is being unfolded or deciphered as to the genetic code, and what this has to do with the possibilities of manipulating human behavior and human development. This recently has come to be included more and more as part of this complex phenomenon of technological change. Dean Emeritus Harold K. Schilling of the Graduate School of The Pennsylvania State University, and now Distinguished University Professor--himself a physicist--has lately been voicing his own deep concern about this matter of biological manipulation and control.

Another important point has to do with the rate of this technological change. The speed-up in technological change, the rate of acceleration of technological change, we are told, has now assumed such dimensions that we have to speak of it, algebraically, as exponential rather than arithmetically. It is not change speeding up at a rate of 2 x 2 but change speeding up at a rate of 2^2, 4^2 and so on.

Advanced and meteorically advancing technological change, then, is our concern. Technological change itself is not new. Technological change goes way back to the application of the lever to making man s work less laborious. It goes back to the wheel. It goes back to sail power, to wind power as substitute for the manual power of the slaves in the Roman galleys. It goes back to the windmill. It goes back to the inventions brought in by the industrial revolution, to the further inventions in this area brought in by the applications of electricity to our industrial and other technically linked efforts. Technological change, then, has been going on for a long time.

It is the speed-up in the rate of acceleration that is so important. We see, then, first mechanization as I've been describing it. We see, next, one of the high points in this process of technological change as applied to industry and from that point to other aspects of man's activity. We see the phenomenon that, within the past couple of decades, has been called "automation," suggested by the assembly lines in the automobile plants in Detroit and elsewhere. Then, most recently, within the past ten years, just about a decade, we see the latest stage in this whole process--namely, the linking of the computer with the automated machinery to produce what has been called and what gives the title to my talk this afternoon, "the cybernated technological operation."

Cybernation, we have come to that word. It is a word coined by the late Norbert Wiener. The term cybernetic comes from the Greek suggesting a steersman or a helmsman. It suggests a whole matter of investigating control,--control of behavior, control of action, but especially with regard to communication processes that have to do with that control.

In his pioneering studies to which he gave the name of "cybernetics,"[1]

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[1] The following very interesting commentary on "Cybernetics" appears in the "Q & A" section of the New York Times Book Review for May 30, 1965: "Jack P. Hailman, Newark, N.J., writes, "The derivation of the word "cybernetics" seems more involved than even Norbert Wiener thought (query by J.M., May 2). Wiener derived it from the Greek "kubernetes" or "kybernetes," meaning "steersman." However, a more general word is "kybernetike," the art of steermanship, in both technical and general senses. Apparently unknown to Wiener, Plato used the latter word frequently, and from this root sprang "gubernaculum" (helm) and similar Latin words connoting both literal and metaphorical senses of control. Wiener knew of these words, and called them 'corruptions" in his book "Cybernetics."

From Latin it became the French "governail" (rudder, in the literal sense only), and then the English "governor" and "government"

Norbert Wiener himself utilized electronic devices, computer-like devices to do two things. He utilized those devices to see if we could get greater light thrown on the kinds of controls in communications that are exercised within our own organism as we try to function. Conversely, he tried to utilize neurological understandings to throw light on the behavior of these complicated electronic machines. In so doing, he gave powerful impetus to technological change itself. And it is this advanced sophisticated and exponentially accelerating technological change that we call cybernation which is already having a far-reaching and pervasive impact upon man and society. It is having a pervasive social impact. It has very complex relationships to social change.

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in a restricted metaphorical sense. Watt returned the English term to a technical context with the "governor" mechanism controlling his steam engine (1790). As acknowledged by Wiener, Maxwell enlarged the term in his "Theory of Governors" (1868), sometimes reckoned as the true beginning of the science of cybernetics.

"Before Maxwell, however, Ampere derived from Plato's word the French term "cybernetique" in his "Essay on the Philosophy of the Sciences" (1834). Ampere meant by it something such as "the study of governmental action and organization," and it is undoubtedly to this usage that Wiener refers. Ampere's word appeared in the nineteenth-century dictionaries of the French lexicographers Maximillien Littre and Pierre Larousse, but probably was not used again until Wiener "re-invented" the word in English. I cannot trace Wiener's reference to a Polish scientist of the last century."

Albert Parry, Hamilton, N.Y.; David B. Krutzel, Huntington Station, N.Y.; and C. Parker Wolf, Providence, R.I., also replied to the query. None, however, could identify the Polish scientist who had used the word in the early nineteenth century.

Wiener's *God and Golem, Inc.*, received a posthumous National Book Award as the best book in 1964 in the field of science. His *The Human Use of Human Beings: Cybernetics and Society*, in its second edition, revised, is a Doubleday Anchor Book (A34). His *Cybernetics: Or Control and Communication in the Animal and the Machine*, first published in 1948, is now reissued by the M.I.T. Press as a paperback. John Pfeiffer, author of *The Changing Universe* and *The Thinking Machine*, has reviewed this volume in the lead article in the *New York Times Book Review* for April 18, 1965.

– It is not a one-way cause-effect relationship. It is a matter of two-way interrelationships in which each of the "parties" involved is at times cause and at times effect--at times that which is acting; at times that which is acted upon. For example, technological change is partly the product of some of the likewise exponentially accelerated *social* changes of the past several decades. But, also, in turn, technological change influences the social changes.

Also technological change has very far-reaching implications for the individual, and it is going to have even greater impact and implication for the individual. At the same time, individuals--through inventions, for example--have a pronounced effect on technological change. Again, what we have is two-way relationships, interrelationships, what the ancient Greek historian Polybius called "transactions."[1]

Some of those who have been signaling the far-reaching and drastic impact of technological change on the individual have been accused of being impractical visionaries. They have been dismissed as Cassandra or Jeremiah Prophets of Doom. So I am purposely not going to draw on their dark picture of the impact that this cybernation has already had on the individual and on their predictions of a far deeper and disruptive impact in the very near future. Instead, I am going to turn to a pamphlet recently issued by the Federal Reserve Bank of Philadelphia. It is in a series that the Bank has been putting out. Indeed, one pamphlet on automation came out just about six months ago. In this present pamphlet, which has to do with "The New Poverty," there are these passages, which suggest the full force of the impact of technological change.

> It is ironic, but the technological revolution which opened the door to prosperity for the majority also slammed that door tight shut in the face of a sizeable minority. The essence of the revolution is change, accelerating and

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[1] Citing Polybius' use of this term, Hadley Cantril has revived it in our time. ("The Individual's Demand on Society," in *The Dilemma of Organizational Society*, ed. Hendrik M. Ruitenbeck, Dutton Paperback - D124).

> pervasive change. Not only has the way we produce goods in our factories undergone sweeping change but so has the way we sell groceries, keep school, heal the sick, raise the crops, to give but a few illustrations. As the revolution progressed, some workers were not able to keep pace with the change. Maybe they were too old or too set in their ways. Maybe they ranked low in mentality or had been denied an adequate education. For one reason or another they lacked the inherent flexibility to adjust to the fast-changing conditions in the labor market. As a result the wave of affluence began to sweep by, leaving them and their families in eddies of poverty.

And then another passage:

> As the post-World War II period progressed, people who sank into the quagmire of poverty found it increasingly hard to get out. The technological revolution was eliminating many of the manual jobs that once were the first rung on the ladder up to the comfortable middle class living. Those unskilled tasks that remained rated low wages and low prestige. Thus it became harder and harder to escape poverty.

I do not wish this afternoon to enter into a discussion of this whole social problem of poverty amidst affluence. I have seized upon the passages merely as a short-cut way of suggesting how advancing technological changes generally, and, more specifically, the cybernational kinds of changes, have been invading the domain of the individual and his personal, his family circle. When I use the word *invasion*, however, I do not necessarily intend a negative meaning. In some instances, the invasions have been those of positive challenge and those of positive promise.

The examples that I have cited from this pamphlet come from the realm of nuts-and-bolts, bread-and-butter concerns. But especially someone like me, whose professional realm has been that of literature, philosophy, history, the humanities, someone like me, many of us,--we are just as much concerned with other types of impacts, positive and negative, of this drastic and exponential technological change and cybernation upon the individual.

We are concerned with the question: What does all this do to the texture of individual life? Not just the life of a dislocated, a displaced worker, but the lives of the rest of us, the lives of these middle class people who are mentioned in these pamphlets as well. The lives of us in professional circles of American effort, as well as those that were mentioned in that pamphlet--what does it do to the texture of our lives? What does it do to the tone, to the rhythm, to the quality of our living, to that which we call "value" in our own individual lives? Value in terms of our self-realization and self-fulfillment--in the phrase popularized by Abraham Maslow, our "self-actualization"? These are some of the searching questions which, in addition to the more immediate economic questions, some of us have been trying to face freshly in our conferences and seminars.

One of the big problems in trying to assess what all of this does mean, can mean, should mean to us is the very abundance of articles and features and series and TV documentaries and books dealing with this whole business, the spate of these things coming out just this year. Take just the period from last January 1, 1964, to now. One of my assistants is compiling a bibliography for this period. It is just overwhelming how many entries there are--all the way from short newspaper items to lengthy treatises. We have a whole spate of cartoons and other jokes dealing with advanced automation and cybernation. We have TV programs that deal with them. We have the program, My Living Doll. When My Living Doll is confronted--with situations for which she--or it hasn't been programmed, especially situations involving human emotions, it remarks, "It does not compute." The very abundance of all this outpouring of "literature" and audio-visual material about advanced technological change makes it difficult to see the forest for the trees.

What we may do as part of the way of seizing hold of this is to view a picture that has been given of what happens in a business, a plant where the most advanced cybernational applications have been made. After that, I would like to tell you of some of the pieces of studio wisdom, some of the guidelines for our future constructive effort that I've been gleaning, as an amateur--but a devoted amateur--in this whole problematical, exciting, and challenging area.

This is from an article in the current issue of the Michigan Quarterly Review, and it is by a Dr. Alice Mary Hilton, who is a combination of a professional student of languages and comparative literature and a student and consultant in this field of cybernetics and cybernation. She gives us this picture:

> In a Chicago suburb, in a bakery as large as a football field, bread and rolls and cakes and cookies are produced for millions of households throughout the country by a team of machines, called a system.
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> Factories have been growing larger, production has increased and machines have become complex for more than a century, and size, increase in productivity, or the complexity of machine systems have long ago ceased to be newsworthy. In this bakery the revolutionary change, unknown before this decade, is not its size, productivity, or complexity--impressive though they are--but its cybernation (or true automation) which means that the entire huge operation is run by a completely self-sufficient and self-contained machine system. The enormously complex business is guided, directed, controlled, and monitored by an electronic computing machine, the central and integral part of the machine system that serves as nerve and message center.
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> The mixing and blending of flour, sugar, milk, butter, and all the other solid and liquid ingredients is directed and constantly supervised by the computing machine whose electronic pulses busily carry instructions to the other machines and bring information from sensory devices about conditions, performance, and progress back to the central computing machine. The mixing and blending is done according to recipes, or "programs," stored on magnetic tape, punch cards, tiny doughnut-shaped "cores," magnetic drums, or similar devices.
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> Apart from the mixing, blending, and baking, the computing machine controls supplies so that raw materials are ordered and thriftily kept at the proper level--not so much as to waste storage space or risk spoiling, and not so little as to keep any of the mixing and baking centers idle. Baking time and oven temperatures are computed and continually adjusted to the slightest change in outside conditions. The baking process is constantly monitored and controlled. Conveyor belts, for the transport of raw materials to mixing centers, dough to baking containers, containers to ovens, cooling racks, freezing plants, dispatch centers, and trucks, are directed.

And the entire production process--from ordering of raw materials to shipping of finished goods--is only one of the functions of the cybernated system. The computing machine also performs management functions for the business end of the bakery operation by controlling and monitoring the component machines to calculate, for example, the optimum number of rolls to be delivered on any day to each customer--not fewer than he might sell, but not so many that he will return them--always considering weather conditions, the day of the week, impending holidays, and many other variables that might influence consumption. This calculation is transmitted to raw-material dispatch centers, mixing centers, and so forth, right to the shipping department and the delivery trucks. And everywhere adjustments are made, orders corrected, space re-allocated, all in order to assure the optimum efficiency and economy of operations.

The computing machine is programmed to process the payroll for the company's diminishing number of employees and the invoices for its increasing number of customers; to compute the market prognosis, adjusted in accordance with trends in taste, seasons, advertising, and any other influences the programmers have thought of; to provide information about past experience to modify advertising; to calculate any changes thereby required in the production, purchasing, and distribution patterns; and to monitor all phases of operation to assure that instructions (with all modifications) are carried out. In other words, the system is capable of an interchange of information that permits the most complex relationships in continuous cycles of adjustments, feedback, modifications, and learning, at speeds expressed in as unfathomable a unit as a "micro-second" or a "nano-second." Still the potential applications of the system are not exhausted; and, like every other cybernated machine system in use now, it is underused. The real potentials of cybernated machine systems are barely imagined yet; they are limited only by the system's storage capacity--the feasible number of magnetic tapes, cores, drums, and other devices that contain instructions and data.

Storage capacity has expanded a million-fold in a few years, from thousands of items to billions, and will indubitably be expanded in the next few years. The only other limitation is in the vast human imagination of the systems analysts who must invent functions, determine criteria, and

> specify the variables for the program. Here again, progress in a few years has been remarkable.[1]

Here, then, is one picture of the kind of thing that is suggested by the term *cybernation*, and by the idea of the challenge and the promise of that cybernation for the individual in terms of human values. It is not the most complex and sophisticated sort of picture. I am sure that some of you here listening, from your own observation and your own technical and expert work, could give far more vividly complex pictures of this sort of thing. But it is useful because of Dr. Hilton's engaging way of weaving these details together in a form that is other than a mere mechanical inventory and also partly because of the comprehensive and interrelated picture that she presents.

Now what are some of the lessons that I have learned from my recent confrontations with what this picture represents and implies? What lessons have I learned--as a humanist, not professing to be an economic or psychological or social expert? What lessons have I learned as a kind of concerned layman devoted through the years to education which involves the development, the strengthening, the refining of such human values as the esthetic values and the ethical values, such as justice, compassion, sympathy? What are some of the lessons that someone in my position has been able to learn in these months during which I've been trying to familiarize myself with this matter of Technological Change and Human Values, and to help other adult laymen to familiarize themselves with this?

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[1] From "Cyberculture - The Age of Abundance and Leisure," *Michigan Quarterly Review*, Vol. III, No. 4, October 1964, pp. 217-218. This was one of the working papers for the CCLE-IBM T/C-Humanities Seminar of June, 1964, on the theme of "Work, Leisure, and Education in a Changing Industrialized Democracy." Dr. Hilton is President of the Institute for Cybercultural Research; Director of the Annual International Conference on the Cybernational Revolution," and editor of the proceedings of these conferences--as *The Evolving Society*, as well as of the journal *Feedback*.

First of all, I have learned that we have to make a basic distinction. There are, for one thing, the efforts that are being made nowadays on all sides to provide information about the sheer physical, technological, aspects of what is meant by cybernational change and operation. We must distinguish between this informational aspect and those efforts that are made to develop among us appropriate attitudes with regard to these great phenomena--emotional attitudes. These are our feelings about these things. There is the whole business, also of our imagining with regard to these cybernational phenomena.

I have learned that it is very difficult to move from the information-dispensing and the information-receiving aspect to the more difficult, more inward process of getting ourselves and getting those that we work and live with to make the appropriate inner, psychic adjustments. I have found that there is a great deal of resistance on the part of many people to a realistic confrontation of the full impact of vaulting technological change. And I am stressing this problem this afternoon because it seems that the difficulties of this process of education of these people and of us ourselves has particular and complex relevance for us as teachers, as educators. It hits us teachers as persons, as individuals. It hits us as citizens. It hits us especially as professional practitioners. Advanced cybernation, other advanced technological changes, are modifying the very climate, the very conditions, the very methods and instrumentalities of the teaching-learning process to which most of us here are devoted. It forces us to reexamine the contents, the aims, the purposes, the goals, the objectives of the educational processes that we try to initiate and develop with our students.

Exponentially accelerating technological change raises questions of what changes are we to make with regard to the amount and the kind of information that we have to impart to our students. What changes in modes of imparting this information? What changes in the area of skills--where we are teaching skills--supposedly marketable skills--

to our students? What are the changes implied by the picture given — above of just one advanced cybernated plant in a midwestern city? What changes in attitudes and feelings and emotions and imaginings does it involve for ourselves first, and then for our students? What does it do, for example, with regard to such concepts as the sanctity of work? What does it do to the deeply instilled tradition among us Americans and pervasive in our educational system--namely, of work as one of the great justifications in our living? What does the picture of the possibility of the release of many men from a great deal of such work, mean for us educators? What does it do to our whole notion of leisure, ("Satan finds work for idle hands," etc.)? What does it do to our thinking about our teaching about work and leisure, and for work and leisure?

What, generally, are we to do to minimize the admitted undesirable possibilities of this cybernational age? Some of the most enthusiastic practitioners of cybernational change are among the readiest to admit that there are risks and possible dangers and pitfalls in this. How do we respond to the challenge to make the most of the positive potential in this sort of change? To make the most of it in terms of psychological values, in terms of ethical values, in terms of esthetic and social values in living.

The picture we have viewed of cybernated industry raises some very fundamental questions, for example, in my sector of education, the adult sector of education. Let us suppose, for the moment, that the predictions of some of those who look ahead will come true, and that many, many adults who hitherto have had many more hours of their lives occupied with market-valuable work (rewarded in dollars and cents) will get new blocks of open time. What happens to them when they get what are called these great blocks of new leisure, or new open time, new spare time? Are they to do with that kind of time what they like? This gives a great challenge to us educators of different kinds, and especially for those of us who profess such subjects as literature, history, social studies, behavioral-social sciences, the natural sciences. It gives us a whole fresh challenge with regard to what we can do in the way of this kind of education.

Let us take another step. Some of us believe that continuing -- liberal education is desirable instead of some of the other kinds of occupations that people with their spare time might be concerned with. How far may we go in 'coercing" such people to this sort of education? Have we a right--with however benevolent intentions--to coerce individuals to gain a certain kind of educational experience? I speak feelingly of this because it comes very acutely home to me in connection with the development of the work I'm doing in connection with liberal education for adults. But I'm sure that, wherever we are on the educational spectrum, the cybernational phenomena that I have been describing persistently thrust, or should persistently thrust, similar searching questions at us.

Just in terms of what we may have to be doing with regard to the vocational education of our youngsters in itself constitutes a major challenge here.

So, as I and several of my associates address ourselves to this problem of technological change and human values, and especially as educators as teachers, we have gained a few bits of studio wisdom. We have gleaned a few kernels, if you will, of a kind of pedagogic harvest, an educational harvest. We have realized something about the complexities of the technical details that are involved in advanced automation, in computerization, in cybernation. Our realization has to do with the harnessing of the computer, which enormously extends man's brain power, to the automated machine complex, which already has vastly extended man's brawn power. In spite of the complexity of the details, however, the fundamental meaning can be very simply stated. It is precisely the unprecendented augmentation of brawn power by augmented brain power. When you add that, just as fabulous as the actual developments of this combination, are the present accomplishments and the future promise of this combination, you have the whole phenomenon encapsulated.

What you have is a synergistic combination--a working together in which the sum of the contributions of the two "parties" is far, far greater than what each could achieve working alone. It is not just a matter of adding the work output or potential of the one to the work output or potential of the other. It is, again, a matter of increase in something like geometric proportions. Like the speed-up in the rate of technological change itself, the combined results of the electronic brain power and the electronic brawn power, working together, is to be expressed, not in terms of arithmetic multiplication, but in exponential terms. These constitute the simple realization that has become more and more strongly emphasized in our coping with the meanings of technological change for the human values that make for the dignity of the individual. A simple realization--but of far-reaching, deep-penetrating implications for the life of the individual and the practice of the teacher.

Something else we've noticed. There is an irreducible clash among the experts themselves as to the dimensions, the nature, and hence the meanings for education and for human values, of this vast and sophisticated, complicated web of technological change. On the one hand, we have those--and they include in their number highly respected authorities--such as Professor Yale Brozen of the University of Chicago, for example, and Dr. Kaplan of the Brookings Institution. I heard Professor Kaplan only this week-end, at the University of Delaware, at a conference on what constitutes education for competence in this cybernational age. I heard Dr. Kaplan assure the group there--about a hundred leaders from management, from education, from the arts, from religion, from the media, I heard him assure us that this whole phenomenon was not radical in the sense of causing a drastic root-upheaving turmoil.

Dr. Kaplan gave us some historic figures from his economic studies to indicate that this has happened before, that job dislocations and displacements happened when the linotype machines came in; that they happened when the weaving machines came in, and so on. Dr. Kaplan insisted that, after some temporary dislocations there is a readjustment, a steadying, and there is resumption of a kind of business-as-usual. This may be along a somewhat different line; it may be on a somewhat different level. Yet, basically and in the long run, it does amount to "business as usual." At that same University of Delaware meeting, Dr. Luther Evans--who, until last year, was director of the National Education Association Automation Project--said the same thing to the same group.[1]

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[1] Let us provide, here, some notes on "The Battle of the Statistics" with regard to "Manpower and Technological Change." To date, there has been no final and universally accepted set of conclusions with regard to the nature of present and impending impacts of technological change upon jobs. There is, as yet, no agreement as to the statistics, themselves, of employment and unemployment, generally; as to the causative relationships between what these statistics state and the impact of advanced automation; as to the assessment of the degree of acuteness of the problems, if any, created by this impact; as to the proposed solutions to these problems, as alleged.

For purposes of gaining most out of our study, what are we to do with this persistently unclarified situation? The following are suggestions: 1. We can familiarize ourselves, particularly, with some of the recent writings on this subject--such as, the series on technology and the labor market beginning in Fortune for January, 1965 (Charles E. Silberman, "The Real News about Automation"), and for February, 1965--"The Comeback of the Blue Collar Worker"--(71:153-155, 210-216). Peter F. Drucker's "Automation Is Not the Villain," New York Times Magazine, January 10, 1965, R.A. Gordon, "Has Structural Unemployment Worsened?", Industrial Relations 3: 53-77 (May, 1964); Newsweek, The Challenge of Automation, pp. 73-80, January 26, 1965. See, also, Feedback, 2:1, February 1965--for Dr. Hilton's reply to Silberman's attack on her in the January Fortune. 2. In addition, we may read in this connection the three main papers of the CCLE-Shenango Valley Community Forum on "Technology and Community Values." These are the papers by Walter K. Bailey, Chairman of the Board, Warner-Swasey Corporation; Walter Davis, AFL-CIO Committee on Political Education, and Past President, School Board, Cleveland; and Sheridan Maitland, Staff, Office of Manpower Automation, and Training, United States Department of Labor. These papers may be secured through the CCLE-IBM Humanities Project on Technological Change, 103 Sparks Building, University Park, Pa., 16802. 3. We may adopt the "as if" approach that is often so fruitful in research and development. We may play a game (as in "war games"). We may assume, for purposes of clarification and to "feel out" future possibilities and alternative

Yet, on the other hand, you have those who insist that, we for example, as teachers, you and I cannot handle this problem by assuming that it is simply the latest phase of a process, technological and cultural, that has been going on for some centuries at least,--especially, since the Industrial Revolution which got under way in the Eighteenth Century. They insist that what we are witnessing is utterly revolutionary.

I am using as many superlatives as I can because this is what they insist, and this is what many people--laymen and authorities--refuse to accept. Some make the refusal on a well-documented grounds; others, on emotional grounds.

But, on whatever grounds, they refuse to accept it. The "drastic" interpreters of technological change give several kinds of justification for their claim that the impact of the newer technological change is far too extreme to be treated as something more of "the same old thing." They give several kinds of justification as to why the sorts of changes described as coming together in that mid-western bakery indicate something unprecedented for us--for man as a whole, for world society and, more specifically, for American society.

Some of them go all the way back to Aristotle, by way of the modern philosopher Whitehead's paraphrase of Aristotle. This is that, when you get changes happening so very abundantly, and so very

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modes of action, that the net impact of advanced technological change on jobs--especially through cybernation--will combine with other causative factors so as to reduce, for many, the time spent on "market economy" jobs, and the opportunities to hold such jobs at all. We may then try to set up alternative models (a) as to what may happen if we just let the tendencies take their own course; (b) as to what we may regard as desirable alternatives. We may then "fool around" with ways of realizing these alternatives. We often say that the purpose of liberal education is to liberate us. One of the ways of such liberation is to be able to imagine more ways than one to solve a given problem; and, again with imaginative foresight, to try to gain an understanding of these possibilities. Having more alternatives to choose from, we are emancipated from the imprisonment of "the blind alley," or the entrapment of the "this or nothing choice."

fast, even though these changes, separately, are not different in nature from past changes, nevertheless, by their sheer abundance, frequency, intensity, and pervasiveness, they constitute, in effect, something different in kind. Hence they call for human, for social adaptations similarly different in kind.

These people, citing Aristotle and Whitehead, insist that this is what we are witnessing now; and that far more of this, happening much faster, is what we have to prepare ourselves and our students for in the future. They use some analogies to suggest their opinion of the utterly drastic significance of this change. I am using the word 'drastic' not in a necessarily threatening sense, but to try to suggest something that goes to the basis of things--like radical surgery. They use the biological analogy of the mutation, and they say that what we are witnessing, culturally as well as technologically,--what we are witnessing socially and individually, is a mutation. Now, by definition, a biological mutation constitutes the beginning, if you will, of a new kind of organism. These people sometimes use the mathematical term--or rather the term taken from physics--of the quantum jump; and they insist that this is what we are witnessing and what we are deeply involved in.

What has interested me about this is the following: Very often individuals who differ on so much else agree on this thesis of the radical nature of the impact of technological change. They may be of different religious traditions, socio-political traditions, philosophic traditions. They may differ, even, on the whole question of how man knows anything anyway. Yet often two of them, otherwise so different, will agree either on the absolute novelty of the phenomenon with which we are challenged or, at least, that this phenomenon cannot be treated as business almost as usual, with some familiar adjustments to be made.

Something else I have noticed. Very often, the statistical student of these phenomena tends to assure people that "in the long run" or "history tells us" or "by and in the large," these changes can be regarded as not being a radical departure from the past. Yet some of the people who themselves have been contributing most ingeniously to the advancement of cybernational invention are among those who plead, in most urgent tones, that we take this most seriously as a penetrative power that goes to the roots and causes basic upheavals.

Mind you, they do not say that this is of necessity dominantly negative. But once again they do insist upon its utter novelty, and therefore they insist that you and I, for example, as teachers have to bring to bear on this challenge something so difficult for most of us. That is, we have to bring novel vision, fresh approaches to our efforts to make these changes constructively meaningful in terms of our own teaching, as well as in terms of our own individual lives and in terms of our lives as citizens.

This, then, brings us to the glowing focal point, I think, of the crucial issue toward which my discussion has been moving. It is this. Let us suppose for a moment, just for purposes of projecting into the future a little bit, that the people are right who insist that cybernational innovation brings about utterly novel situations and problems and challenges for you and me. Does this mean, also, that there is a similar fundamental challenge to our inherited human values, our inherited notions for example, of what is beautiful, and what we want around about us to make our lives beautiful? Does this mean that there is a challenge to our traditional social values? To our ideas as to who is the good man, and how do we educate the good man? Does it constitute a similar "radical" challenge, going to the roots, of our notion as to what is the good society, and how do we achieve that good society?

To reiterate, does it constitute a similarly radical challenge, for positive effect or for negative, with regard to our inherited ethical values? To keep within my time limits, I'll just symbolize the whole complex of those ethical values by reminding us of the Hebraic-Christian twofold Law of Righteousness, the Law of Justice, the Law of Mercy; and, to me most important, the law of the creative mediation or reconciliation between those two.

Here we may put the problem thus: Does technological change call for the replacement of our traditional ethico-spiritual values by an utterly new set or system of ethical values and pattern of morality? Or do the traditional ethico-spiritual values remain essentially the same--the problem being: how to bring the traditional Judeo-Christian ethico-spiritual values or ethico-spiritual imperatives to bear, freshly, upon the radically altered "situation of man," as conditioned--but not altogether determined--by exponentially advancing technological change?

On another level of ethical values, does this challenge cause us to reassess our whole notion of what constitutes valuable activity--what constitutes valuable work, what constitutes valuable leisure activity? At this focus of the challenges, I would like to put a period to my limited remarks designed to open up and point to a few landmarks in a vast terrain, most of which still remains to be charted.

MR. MCMILLEN: Dr. Goldberg, we are indeed thankful that you were able to come down and join with us and tell us all the implications of the tremendous cybernational revolution. I think we all have certainly gleaned some ideas from the talk. I suspect there are some questions in the group. I am just wondering: just what is it that this great technological change is going to do for us? It seems to me that one thing we have to be concerned about is whether we will know what to do with the new leisure time. Do you visualize a situation here where you are almost predicting that the children we have in our high schools today, by the time they are out and earning a living, can several years from now very well have a ten-hour week? Is this what we are tending to? We may very well be hard pressed to find constructive work for them that will require their services for any more than ten hours. Is this true?

DR. GOLDBERG: I would like to make clear that I am not myself a statistical predictor. I cannot compete with those machines, those computers, that did the job they did with regard to election prognostications the other evening. I cannot say in terms of numbers of hours and so on and how many people are going to have how much more leisure. But I am firmly persuaded--and this is a matter of agreement both among those who say that this is a novel situation and those who deny this--there is going to be much more leisure for many more people.

Now a couple of comments that I would like to make briefly. One is that this leisure is not going to come to people like you and me. That is, we people--professional people--apparently some of us, if we want to, we are going to be working sixty hours a week, as some of us do already. That is the first item. The second is that much of this so-called leisure is going to come to people who, at least if they got it today--present adults--would be least able to handle it in other terms than routine recreational occupations--TV, beer, boating, so on. Therefore, it would follow that those of us who have a chance to work with the school youngsters now--and even the college youngsters, although they are further along--we must take this into account. We must somehow develop notions of the constructive use of leisure that will enhance human dignity and give the individual a continued sense of worth even though he no longer will get that sense of worth so much out of the so-called "market economy job." How to do this--I am giving much of my time and thought to this problem, and I am working at it with several groups in the State College area.

MR. MCMILLEN: The meeting is adjourned. Those of you who would like to stay and pursue this, won't you feel free just to sit right here or move up front.

NEEDLES AND BURRS: THE PROBLEM OF ESTABLISHING HUMAN VALUES IN AN AGE OF TECHNOLOGICAL CHANGE

This collection was originally brought together by Professor Alan Trachtenberg and Mr. Stephen Knox to stimulate thought and discussion at the CCLE-IBM Humanities Project Conference on Technological Change and Human Values (December, 1963). It was so warmly greeted that, for subsequent programs developed by this same project, additional items were added--chiefly by Mr. John Low, Mrs. Annette S. Levitt, Mrs. Patricia Kochanek, and Mr. John Swinton. Gradually, the present form and format took shape.

In the interim, under the title "Points of View--More or Less Predictive and/or Provocative," those selections directly pertaining to technological change, education, and human values were published in Automation, Education and Human Values, a School and Society book (New York, 1965) edited by William W. Brickman and Stanley Lehrer, and consisting, for the most part, of papers developed by the CCLE-IBM Humanities Project on Technological Change.

It is a pleasure to record that authors and publishers graciously gave the courtesy clearances which the compilers of Needles and Burrs requested.

NEEDLES AND BURRS: THE PROBLEM OF ESTABLISHING HUMAN VALUES IN AN AGE OF TECHNOLOGICAL CHANGE

Inquiry begins, writes F.S.C. Northrup, only when there is a problem. The problem may begin as an irritation, but then needs to be put into words in order for inquiry to happen. It must affect the imagination as a genuine conflict. For inquiry is not idle curiosity; it is spurred by the need to know and to master, to discover and to act. Inquiry is part of the process by which men change themselves and their world.

Discussions concerned with the human implications of technological change are not conducted to solve specific problems but to inquire into the general problem. We begin by asking questions, and hope to learn through experience to ask even better questions, in order to act more effectively to control our common life with the highest degree of intelligence available to us. We ask questions to discover answers and plans for action. But answers very quickly become new questions, and the process continues. The assumption of democracy is that free discussion is the best assurance that the process will stay alive.

Our common concern is, of course, the common good. From the point of view of the common good, all specific problems arising from technological change, such as unemployment and cultural poverty, assume a larger importance. Viewed from the perspective of the whole, technological revolution is the most recent phase of man's changing relations to his environment. Superseding ages of superstition and magic, and arising out of the devout quest for empirical knowledge, the technological age has given men multiple instruments of control; it has narrowed the range of fear and has increased human confidence. On the other hand, the changes have been so rapid and so radical that their implications for social life have not been entirely recognized. Facing the newest machine age, man seems again to be facing the unknown, and fear seems to be increasing. Deep consideration of remarks such as these that follow can help us to regain a rational hold on our destinies and to regain a humane outlook. However, this kind of consideration may require us to jettison old ideas--perhaps even old institutions--and to redefine the human problem in unfamiliar terms.

What follows is an assortment of opinions and fancies on various issues: on automation, on liberal education, on leisure, on manpower, on abundance. The items have been collected as a sampling of contemporary responses in a changing world. They are meant to serve as "needles and burrs," challenges to the mind and imagination, provocations, instigations. Roughly they give the lay of a newly discovered area which has just begun to yield to exploration. Like most primitive maps, this one has been drawn from only a partial knowledge of the variations in terrain which may be encountered. Like most maps it should be continually revised and amended.

A framework, in the form of this outline, has been provided as a means of delineating more concisely various aspects of the problem under discussion:

NEEDLES AND BURRS: THE PROBLEM OF ESTABLISHING HUMAN VALUES IN AN AGE OF TECHNOLOGICAL CHANGE

I TECHNOLOGY AS THREAT OR PROMISE

II THE PATTERN OF THE WORKING DAY

    A. Unemployment and Economic Dislocation
    B. The Problems of the Employed
    C. The Alteration of Traditional Basic Roles
    D. The Opportunities of Abundance

III THE SHAPE OF THE COMMUNITY

    A. The Outlook for Democratic Values and Institutions
    B. The Place of the Individual and the Role of the Group
    C. The Conflicting Demands of Freedom and Responsibility
    D. The Path to the Future and the Necessity for Choice

IV THE NATURE OF THE GOOD LIFE

A. The Technological Impact on Traditional Human Values
B. The Components of a Humane Civilization
C. The Uses and Abuses of Leisure
D. Education for Orderly, Free, and Humane Change

> The goal of the sciences is none other than this: that human life be endowed with new discoveries and powers.--Bacon

> The art of progress is to preserve order amid change and to preserve change amid order.--Whitehead

I TECHNOLOGY AS THREAT OR PROMISE

How inadequately we have phrased this title! How clearly the problem seems to be posed! While we have chosen a taut phrase for the sake of dramatization, the following section of "Needles and Burrs" reveals that we cannot yet be certain whether our technology is helping to mold a better society or anesthetizing us to the feelings and needs of the people around us; whether our machines are directed toward the goals of emphasizing the worth of our fellow men and achieving the greatest good for the largest number of them, or are increasingly allowed impersonally to make too many of our decisions.

Unfortunately we can still only talk hazily about potentialities--threats and promises and trends. No series of gloomy threats or group of bright unmixed blessings has yet proved to be the dominant motif in modern technology.

But a common thread does connect all of the following remarks, and it is the belief that a wonderful era of abundance, freedom from drudgery, and humaneness lies practically within our grasp. To gain this era and enjoy its treasures, we must learn not to wield our sophisticated technology recklessly. Instead, we must let it help guide our people toward an acceptance of their accruing bounty, free from feelings of guilt, inadequacy, and worthlessness.

To grow a rich crop, fertile loam must be painstakingly cultivated. To reap the blessings promised by technology, we must not let it take root and spread in unprepared fields and without continual weeding and pruning, so that it can serve us the healthful abundance careful nurturing of good seeds should yield.

The best of seeds, if not carefully tended, either grow wildly without direction or die. Whether an amoral technology will dehumanize its developers or whether we will, at last, be the beneficiaries of the promises inherent in the cautious and wise employment of technology, depends upon how thoroughly we understand its implications and, once understanding them, how devotedly we apply our understanding to the cause of humanity, keeping the realization of each individual's singular worth constantly in mind.

Obviously we cannot consider the cause of man separately from his past and future scientific achievements. If the human spirit continues to flower, it must do so comfortably in a beneficent scientific environment.

> (1) Progress in automation isn't a matter of choice, it's inevitable; (2) the United States must pioneer in this technology or face calamitous economic and political defeat by its competitors; and (3) instead of causing unemployment, aggressive and wise use of automation could multiply jobs and swiftly raise our standard of living.--John Diebold, "Facing Up To Automation," The Saturday Evening Post, September 22, 1962, p. 26.

> Technology does not limit its impact to these economic aspects of society. Far more profound, and in the long run far more disarranging, is its impact on the social habitat itself. In the terrible increase in the destructiveness of war, in the accelerating speed of travel and the weaving of networks of communication, in the complexity and size of social institutions, in the collectivization of modern life we sense the true end product of the machine.--Robert L. Heilbroner, "The Impact of Technology: The Historic Debate," Automation and Technological Change, ed. John T. Dunlop, Englewood Cliffs, N.J., 1962, p. 16. Copyright 1962 by The American Assembly, Columbia University, New York, New York. Reprinted by permission of Prentice-Hall, Inc., the publisher.

The impression we gain as we observe technical processes of any sort is not at all one of abundance. The sight of abundance and plenty gives us joy, they are the signs of fruitfulness which we revere as a life-giving force. Rooting, sprouting, budding, blooming, ripening, and fruition--the exuberance of the motions and forms of life--strengthen and refresh us. The human body and the human mind possess this power of bestowing strength....But the machine organization gives nothing --it organizes need. The prospect of vineyard, orchard, or a blossoming landscape cheers us, not because these things yield profits, but because of the sensation of fertility, abundance, and gratuitous riches. The industrial scene, however, has lost its fruitfulness; it has become the scene of mechanical production. It conveys, above all, a sense of hungriness, particularly in the industrial cities which, in the metaphorical language of technological progress, are the homes of a flourishing industry. The machine gives a hungry impression. And this sensation of a growing, gnawing hunger, a hunger that becomes unbearable, emanates from everything in our entire technical arsenal.--Friedrich Georg Juenger, The Failure of Technology (Chicago, 1956), pp. 20-21. Used by permission of the publisher, Henry Regnery Company.

When Job's life miscarried, he was able, at least in imagination, to confront God and criticize his ways. But the suppression of personality is so complete in an automated economy that the reputed heads of our great organizations are as incapable of intervening in their operations as the lowliest filing clerk. As for anyone's confronting them in person, our automatic agencies are as obscure and inaccessible as the authorities that Franz Kafka pictures in that accurate anticipatory nightmare, The Trial. Humanly speaking, the proper name for automation is organized impotence; and the archetypal hero of our time is no other than Adolph Eichmann, the correct functionary, the perfect bureaucrat, proud to the end that he never allowed a moral scruple or a human sentiment to keep him from carrying out the orders that came from above.--Lewis Mumford, "The Automation of Knowledge," Current Issues in Higher Education (1964), p. 16.

The millions who are poor in the United States tend to become increasingly invisible. Here is a great mass of people, yet it takes an effort of the intellect and will even to see them....The poor are increasingly slipping out of the very experience and consciousness of the nation....The other America is becoming increasingly populated by those who do not belong to anybody or anything....Their horizon has become more and more restricted; they see one another, and that means they see little reason to hope. One might summarize the newness of contemporary poverty by saying: These are the people who are immune to progress....In the optimistic theory, technology is an undisguised blessing. A general increase in productivity, the argument goes, generates a higher standard of living for the whole people....But the poor, if they were given to theory, might argue the exact opposite. They might say: Progress is misery....The very rise in productivity that created more money and better working conditions for the rest of the society can be a menace to the poor....If automation continues to inflict more and more penalties on the unskilled and the semiskilled, it could have the impact of permanently increasing the population of the other America.--Michael Harrington, The Other America (New York, 1962), p. 10. Used by permission of The MacMillan Company. Copyright, Michael Harrington, 1962.

The social revolution in our own day is grounded in the skill of technical science, for without science there could be no forty-hour week and no population which reads and argues, no public health, no women's vote, and no waiting list for motorcars. A child born in 1963 can expect to live to the biblical age of seventy and beyond. That is twice as long as he would have lived two hundred years ago. That is the penalty of living in a revolution: that the world changes faster than our habits of mind.--J. Bronowski, "A Letter to Posterity," AAUW Journal (May, 1963), p. 165. Used by permission of the author.

The future is a door standing ajar. We stand on the threshold of a golden tomorrow. Let the worker face what is to come with hope in his heart, not with fear in his mind. Automation is a magical key to creation, not a blunt instrument of destruction, and the worker's talent and skill will continue to merit reward in the fairyland of the world to come. For the expanding dynamic economy of America, the sky is indeed the limit. Now more than ever we must have confidence in America's capacity to grow. Guided by electronics, powered by atomic energy, geared to the smooth, effortless workings of automation, the magic carpet of our free economy heads for distant and undreamed of horizons. Just going along for the ride will be the biggest thrill on earth!--Robert P. Weeks, Jr., ed., Calling All Jobs (New York, 1961) p. 176. Used by permission of the National Association of Manufacturers.

In the past few years, the existence of Russia as our Grand Competitor seems to have become the main reason in America for thinking seriously about anything. One imagines that if it were not for the looming fact of Russian power, most Americans would be content just to live it up some more, continuing the postwar holiday--and literally ignore the circumstances that our society, even abstracted from the rest of the world, is a dynamic, dangerous collection of human invention and mis-invention which requires a great deal of talented attention just to keep clanking along. We could continue to abuse our historically granted super-privilege to do the wrong thing or nothing at all. And that might not be so bad, since the inevitable restructuring of our society could then continue at a more natural pace and in a more conveniently irrational manner. But as more and more of us are becoming aware, the available time-pockets are being used up and the big crisis is nearly here. It is also becoming clearer that this crisis will be domestic--profoundly domestic. --David T. Bazelon, The Paper Economy (New York, 1963), p. 4. Used by permission of the publisher, Random House, Inc.

As a nation we are now under the control of under-dimensioned minds with five-year perspective, immune to human concerns: indifferent alike to the rich historic past they would nullify or the endless potentialities of the future they would abort or sterilize. Such demoralized minds are capable in fantasy of wiping out sixty million of their fellow-countrymen and congratulating themselves on contriving shelters that might save, also largely in fantasy, the bodies of some fraction of those that would remain....In a world like ours, empty of historical values or purposes, the crassly optimistic reassurances of scientific fortune-tellers are treated as oracles, while the well-grounded warnings of its humane Einsteins and Schweitzers and Russells are disregarded.--Lewis Mumford, "Apology to Henry Adams," Virginia Quarterly Review (Spring, 1962), pp. 213-214.

Unless the extension of technological devices for the material use and convenience of man is directed by stringently ethical and profoundly humanitarian policies, Ellulian pessimism may well be justified. Moral selectivity is indispensible; all knowledge is good knowledge; not all application is good application.--Sir Robert Watson-Watt, "Technology in the Modern World," Technology and Culture (Fall, 1962), p. 388.

Homo faber, the toolmaker, invented tools and implements in order to erect a world, not--at least, not primarily--to help the human life process. The question therefore is not so much whether we are the masters or the slaves of our machines, but whether machines still serve the world and its things, or if, on the contrary, they and the automatic motion of their processes have begun to rule and even destroy the world and its things.--Hannah Arendt, The Human Condition (New York, 1959), pp. 131-132.

I welcome some of the coming changes such as those which help to increase the opportunities for more meaningful lives for a larger proportion of people. But as a father, as a nature lover, and as one who would like to see the traditional goals of democracy better realized, I don't, by and large, like the general trend I see coming. As a social scientist I have to acknowledge that some of what distresses me personally will be all right for those adapted to it; other things I don't think will be all right, adapted or otherwise.--Donald N. Michael, The Next Generation: The Prospects for the Youth of Today and Tomorrow (New York, 1965), pp. xxv-xxvi. Used by permission of the publisher, Random House, Inc.

Recognizing in technology and related disciplines a dimension of man's experience no less valid than others can free us, at last, from past controversies to face the insistent issues of today. A realistic analysis can no longer dismiss the vulgarity, futility, and cruelty which characterize so much of contemporary culture merely by attributing them to an essentially brute technology. Much more study is needed of the conditions which foster or hamper the creative release of human and material resources. Even more than new facts, however, we need the stimulus which only new conceptions of the structure and ends of a dynamic, technological civilization can supply. Past experience indicates all too clearly the frustrations which result either from blind acceptance or blind rejection of technological change; and both acceptance and rejection will remain essentially blind until a new framework of social understanding enlarges our vision.--Morrell Heald, "Technology in American Culture," Stetson University Bulletin (October, 1962), pp. 14-15.

The human being requires a role: cybernation is depriving him of his existing role and is making him vulnerable to centralized control, both economically and socially.--Robert Theobald, "The Cybernation Revolution," address delivered at the 52nd Annual Conference of the Council of the Southern Mountains, Inc. (Asheville, N.C., April 7-10, 1964).

II THE PATTERN OF THE WORKING DAY

At least one characteristic of our advancing technology is the decline it causes in low-level job opportunities. Television and radio announcements and billboard and newspaper advertisements have urged 'Stay in School' until the phrase has become a national motto. The message tries to convey to a potential drop-out the utilitarian idea, "A diploma will eventually help you to earn more money." But increasingly one can also detect another implication: "There is no room for you anywhere else."

A blessing of automation is that it can assume tedious and repetitious assembly-line tasks, freeing those whose spirits have been deadened by this kind of work. However, a counterbalancing tragedy lies in the fact that those thus freed are then denied, by the tenacious application of middle-class, Calvinistic belief in the nobility of steady hard work, the incentive fully to utilize their leisure time in pursuits that might awaken their spirits. To go on the dole--to receive gratis the minimum cash allowance for keeping body and soul together, if not harmonious--is to submit to psychological punishment for having lost the privilege of performing ignominious toil. In addition, extending a vacation and encouraging an early retirement can leave a man with the impression that he is, and has been all along, superfluous.

If the decline in low-level job opportunities continues to gain impetus, our relatively stable and comfortable lists of "the unemployed" will be vastly swelled by masses of potential workers who were never able to obtain jobs in the first place. It seems moot and pointless to inquire whether a more complete education might equip these people with more sophisticated and marketable skills when lack of money accompanied by a dearth of other incentives forces them away from education en masse. For many, even a weekly relief check is preferable to the school they now attend; for others that pittance is an immediate necessity far outweighing the deferred and theoretical rewards of further education.

Attached to the very first relief check is an onus which the recipient bears thereafter. True, the stigma is not a great burden in neighborhoods largely supported by relief checks. But that certain hint of failure, symbolized by the check, often effectively stifles a man's desire to be creative, to maintain the magnetic social link with his friends and acquaintances, and, ironically, to seek future employment seriously. It is not the easily gotten money that inhibits incentive as much as the disdain and rejection the money implies.

Our next section of "Needles and Burrs" asks us to examine thoughtfully four truisms and to decide whether they help us to hear more clearly the metaphorical dialogue between the human values and modern technology. Most important, are they still "true"?

1. Automation does not destroy jobs, it creates them.
2. The man who labors by the sweat of his brow ennobles himself in his work.
3. There will always be a job waiting for someone willing to work.
4. In taking his leisure, a man rests and relaxes himself and indulges in the trivial and non-productive activities suggested by his whimsy as a way of preparing his body and mind for the next day's tasks.

A. Unemployment and Economic Dislocation

> The modern age has carried with it a theoretical glorification of labor that has resulted in a transformation of the whole of society into a laboring society....Even presidents, kings, and prime ministers think of their offices in terms of a job necessary for the life of society, and among the intellectuals, only solitary individuals....consider what they are doing in terms of work and not in terms of making a living. What we are confronted with is the prospect of a society of laborers without labor, that is, without the only activity left to them. Surely, nothing could be worse.--Hannah Arendt, The Human Condition (New York, 1959), p. 5.

> The incongruity between the skill structure of demand for labor and the skill structure of the labor supply seems to be one of the causes of the current unemployment problem. It is fatuous to assume that this incongruity is self-correcting. I strongly doubt that a general increase in economic activity, or "economic growth," will by itself entirely eliminate the incongruity. In my judgment, as a nation we are scarcely aware of this problem and we have as yet no comprehension of the magnitude of the effort required at all levels of training and education to meet it.--"Automation," ed. Charles Killingsworth, Annals of the American Academy of Political and Social Science, March, 1962, p. x.

A manpower training program is an essential arm of a comprehensive, continuing manpower policy, and will be needed on an eventually greater scale in the future. We have achieved limited but important results so far in our manpower program. The ultimate importance of our work rests in the use we can make of our experience in the future. For this we need a recognition of the need for manpower policy and an assurance of continuity. The loss in leaving the development of a comprehensive manpower policy to some future emergency is not simply one of frittering away the valuable work we have already done in the field of manpower, but in frittering away our manpower resources themselves.--Willard Wirtz, Prepared Statement before the Subcommittee on Employment and Manpower of the United States Senate Committee on Labor and Public Welfare, Eighty-eighth Congress (Washington, D.C., May 20, 1963), p. 11.

A....myth that needs to be laid to rest is the belief that those who lose their jobs to automation can be retrained and put into other jobs requiring higher skills and paying more money. As studies have shown, automation is more likely to reduce rather than increase the demands for skills and aptitude and, besides, many workers are just not retrainable, due to their levels of intelligence, education and age.--John I. Snyder, Jr., Prepared Statement before the Subcommittee on Employment and Manpower of the United States Senate Committee on Labor and Public Welfare, Eighty-eighth Congress (Washington, D.C., October 3, 1963), p. 1650.

The Negro's claim to a job is not being met. Negroes are the hardest-hit of the many groups being exiled from the economy by cybernation. Negro unemployment rates cannot be expected to drop substantially. Promises of jobs are a cruel and dangerous hoax on hundreds of thousands of Negroes and whites alike who are especially vulnerable to cybernation because of age or inadequate education.--The Triple Revolution, Memorandum to President Lyndon B. Johnson, March 22, 1964, p. 5. (Reproduced in The Automated State, by Robert MacBride, Chilton Book Company, Philadelphia, 1967, p. 193)

Cybernation will reduce requirements of human labor at all levels, but displacement will begin at the lower levels. Since ....there is an excessive percentage of minority people in the lower-skill jobs, minorities will be, and already are, hit first by cybernation.--Victor Paschkis, "Cybernation and Civil Rights," The Evolving Society, ed. Alice Mary Hilton (New York, 1966), p. 359. Used by permission of the publisher, the Institute for Cybercultural Research Press.

It is our national attitude to distrust the social consequences of any machines no matter how marvelous, and to defend man's inalienable right to toil on like a beast of burden. To be grateful that a machine has relieved a man of his drudgery seems an act of betrayal. When the mail brings a new checkbook with a peculiarly minted account number that can be read by machine, we don't breathe a sigh of relief for the human check sorter. We ask, "What will become of people?"....This is an odd attitude for the most machine-minded nation in the world. Perhaps intellectuals romanticize the esthetic virtues of drudgery to free themselves from the guilt of performing none, while enjoying the fruits of drudgery performed by others. The laborer romanticizes his drudgery because that is the only way he can presume his self-esteem.--Bernard Asbell, The New Improved American (New York, 1965), p. 20. Used by permission of the publisher, The McGraw-Hill Book Company.

There will always be enough work to do in America and everywhere else, to keep every man and woman busy for as many hours a week as future societies think desirable. A glance at the nation's slum-ridden cities, or its over-crowded schools, or even a glance at your own backyard--or mine--will verify this simple statement.--Vannevar Bush, "Automation's Awkward Age," Saturday Review (August 11, 1962), p. 11. Used by permission of Elmo Roper and Associates, which first published this article in its magazine, The Public Pulse.

Cybernation raises the level of the skills of the machine. Secretary of Labor Wirtz has recently stated that the machines being produced today have, on the average, skills equivalent to a high school diploma. If a human being is to compete with such machines, therefore, he must at least possess a high school diploma. The Department of Labor estimates, however, that on the basis of present trends, as many as 30% of all students will be high school drop-outs in this decade.--The Triple Revolution, Memorandum to President Lyndon B. Johnson, March 22, 1964, p. 9. (Reproduced in The Automated State, by Robert MacBride, Chilton Book Company, Philadelphia, 1967, p. 199)

No amount of retraining is going to provide the amount of work that human beings now perform as sources of power, servomechanisms, levers, and things of this sort. No amount of work for human beings is going to replace the work that is being destroyed by automation.--Bernard J. Muller-Thym, "The Real Meaning of Automation," Management Review, June, 1963, p. 46. Used by permission of the American Management Association.

Displacement of labor and other productive factors are essential elements of automation as well as the older mechanization. Personal hardships caused by this displacement must be insured against, but it is important to remember that the displacement itself must not be prevented. Free movement of workers, capital, and natural resources among alternative occupations and geographical areas is necessary for obtaining the benefits of technological progress.--Walter Buckingham, "The Great Employment Controversy," "Automation," ed. Charles Killingsworth, Annals of the American Academy of Political and Social Science (March, 1962), p. 52.

Efforts to explain unemployment as a result of automation have done much more to confuse than to advance the search for better solutions to unemployment problems.--Malcolm L. Denise, "Automation and Unemployment: A Management Viewpoint," "Automation," ed. Charles Killingsworth, Annals of the American Academy of Political and Social Science (March, 1962), p. 90.

The dimensions of our manpower revolution are a labor force rapidly increasing in size and shifting in age composition, rising productivity, a shift in employment structure from goods to services, manufacturing to non-manufacturing and production to non-production, a sharply decreasing demand for unskilled labor and an equally sharp rise in demand for the most highly trained and educated members of the labor force, shifting consumption patterns, changes in the form of business enterprise, geographical shifts in markets, relocation of industrial plants, the depletion of natural resources, changing consumption patterns and other factors which are disguised by the simple term "automation."--Garth L. Mangum, "Automation, Employment, and Human Values," Educational Record (Spring, 1964), pp. 124-125.

The objective of full employment must be accomplished in the face of a virtual manpower revolution which over the next few years will be changing the profile of the nation's labor force in a manner that can as yet be only partly foreseen.--Willard Wirtz, Prepared Statement before the Subcommittee on Employment and Manpower of the United States Senate Committee on Labor and Public Welfare, Eighty-eighth Congress (Washington, D.C., May 20, 1963), p. 5.

Juvenile delinquency: If then, one begins to put together all the elements, this 'social problem' takes on not merely its superficial welfare aspects but its philosophical depths, which I think are the controlling ones. It is not a problem of big cities alone but of rural areas too; not of capitalism alone but of socialism as well; not restricted to the physically deprived but shared by the affluent; not a racial problem alone or a problem of recent immigrants, or a purely American problem. I believe it is in its present form the product of technology destroying the very concept of a man as a value in himself.--Arthur Miller, "The Bored and The Violent," Harpers Magazine (November, 1962), p. 55. Used by permission of Mr. Miller.

Gardner Ackley, a member of [President Kennedy's] Council of Economic Advisors, stated that "there was nothing about the characteristics of the presently unemployed that differed from those in past periods of heavy unemployment" and argued that "increased over-all demand could readily restore full employment." --Edwin L. Dale, Jr., "Technology Defended in Unemployed Rise," The Pittsburgh Post-Gazette (September 9, 1963), p. 12

The viability of our present socioeconomic system is based on a very simple relationship: It is assumed that it is possible for the overwhelming proportion of those seeking jobs to find them and that the incomes received from these jobs will provide adequate funds to allow the job-holder to live with dignity. As a corollary, it is assumed that those without jobs are lazy or worthless, and they are provided with minimum incomes on a charity basis.--Robert Theobald, "Human Rights in a Cybernated Age," Educational Record (Spring, 1964), p. 114.

B. The Problems of the Employed

The failure of the vast masses of men to fulfill the yet unimagined potentials of their minds and bodies is not the result of man's unemployment, but of the unnaturally confining demands of their employment. Each system of production has a way of producing people appropriate to it....Our system of mass production on a belt line, mass addition and subtraction and clerking in cheerless offices, has produced, by the millions, people trained to dull their psyches, anesthetize their dreams, and passively submit their working lives to drudgery with no practical hope of escaping it.--Bernard Asbell, The New Improved American (New York, 1965), p. 26. Used by permission of the publishers, The McGraw-Hill Book Company.

....It has sometimes been proposed that, in addition to their technical and special instruction, workers be given a general education....No doubt, it is good for the worker to be interested in art, literature, etc., but it is nonetheless bad that he should be treated as a machine all day long. Who cannot see, moreover, that two such existences are too opposed to be reconciled, and cannot be led by the same man! If a person has grown accustomed to vast horizons, total views, broad generalities, he cannot be confined, without impatience, within the strict limits of a special task..--Emile Durkheim, cited by Robert Heilbroner, "The Impact of Technology: The Historic Debate," Automation and Technological Change, ed. John R. Dunlop, (Englewood Cliffs, N.J., 1962), p. 18. Copyright 1962 by The American Assembly, Columbia University, New York, New York. Reprinted by permission of Prentice-Hall, Inc., the publisher.

Factory work was divided into separate units, and this "fracturing of work" took away from the workman much of his pride in craftsmanship. The development of assembly-line techniques has exaggerated this trend....There is no question that this division of labor helped make possible the enormous production of goods which raised the material conditions of living for the workers engaged in the manufacturing process. Thus the human imperative of satisfying material wants has been in part met by technological progress through the division of labor. But has the humanistic imperative of the dignity and worth of the individual personality in actuality been sacrificed thereby?--Melvin Kranzberg, "Technology and Human Values," The Virginia Quarterly Review (Autumn, 1964), p. 528.

Some have suggested that automation may bring downgrading rather than upgrading of skills. Certainly the declining employment opportunities for the unskilled and the rising demands for the highly educated do not support this thesis. It is the mundane, tedious, repetitive tasks of life which are subject to automation. Others are concerned with the impact of technological displacement on human dignity. One's dignity depends upon a feeling of usefulness in a respected role in society. Lack of opportunity for self-development and productive employment, not replacement in a repetitive task by a machine, is the crowning indignity.--Garth L. Mangum, "Automation, Employment, and Human Values," Educational Record (Spring, 1964), p. 127.

The man whose whole life is spent in performing a few simple operations, of which the effects too are, perhaps, always the same, or very nearly the same, has no occasion to exert his understanding, or to exercise his invention in finding out expedients for removing difficulties which never occur....His dexterity at his own particular trade seems, in this manner, to be acquired at the expense of his intellectual, social and marital virtues. But in every improved and civilized society this is the state into which the laboring poor, that is, the great body of people, must necessarily fall, unless government takes some pains to prevent it.--Adam Smith, "The Education of the Worker," Of Men and Machines, ed. Arthur O. Lewis (New York, 1963), p. 2.

No normal person is happy in a situation which he cannot control to some extent....The idea that efficient work results from proceeding at a constant rate derives certainly from the operations of machines and not from the characteristic operation of human beings. If anything is clear about human performance it is that it is characterized by changes of pace.--William F. Whyte, Money and Motivation (New York, 1962), pp. 94-95. Used by permission of the publisher, Harper & Row, Inc.

In a familiar story, a Roman Centurion pushed his way into the presence of the Rabbi Hillel and demanded that while he, the soldier, stood on one foot, the sage should sum up the Judaic teachings. Unaffronted and undaunted, Rabbi Hillel replied, "What thou wouldst not have done unto thee, do not that to thy neighbor. This is the law. The rest is commentary."....If, once again, the Roman Centurion approaches the Rabbi Hillel of the history of technology in its interplay with the displacement of human labor, and if, again, the man of action demands the meaning, for the future, of the cultural phenomena, then our man of mind would reply, "As a result of the industrial revolution, human labor becomes an appendix to the machine. Now, in the imminent prospect, the machine 'progressively' renders human labor superfluous, even for non-repetitive jobs. This is the basic text. The rest is commentary."--Maxwell H. Goldberg, "The Displacement of Human Labor: Historic Trends," *The Evolving Society*, ed. Alice Mary Hilton (New York, 1966), pp. 154-157. Used by permission of Dr. Goldberg and published by The Institute for Cybercultural Research Press.

Modern man's state of mind is completely dominated by technical values, and his goals are represented only by such progress and happiness as is to be achieved through techniques. Modern man in choosing is already incorporated within the technical process and modified in his nature by it. He is no longer in his traditional state of freedom with respect to judgment and choice.--Jacques Ellul, "The Technological Order," *Technology and Culture* (Fall, 1963), pp. 395-396.

The plain truth is that factory work is degrading. It is degrading to any man who ever dreams of doing something worthwhile with his life; and it is about time we faced the fact. The more a man is exposed to middle-class values, the more sophisticated he becomes and the more production-line work is degrading to him. The immigrant who slaved in the poorly lighted, foul, vermin-ridden sweatshop found his work less degrading than the native-born high school graduate who reads "Judge Parker," "Rex Morgan, M.D.," and "Judd Saxon, Business Executive," in the funnies, and works in a fluorescent factory with tickertape production-control machines.--Harvey Swados, *A Radical's America* (Boston, 1962), p. 117. This passage, copyrighted in 1957 by the author, originally appeared in *The Nation* and is reprinted by permission of Atlantic-Little, Brown and Company.

I don't like to work on the line....You can't beat the machine. Sure maybe I can keep it up for an hour, but it's rugged doing it eight hours a day, every day in the week, all year long. It's easy for the time study fellows to come down there with a stop watch and figure out just how much you can do in a minute and fifty-two seconds....But they can't clock how a man feels....I like a job where you feel like you're accomplishing something and doing it right. When everything's laid out for you and the parts are all alike, there's not much you feel you accomplish. The big thing is that steady push of the conveyor--a gigantic machine which I can't control. --Robert H. Guest "Men and Machines: An Assembly-line Worker Looks at his Job," Modern Technology and Civilization, ed. Charles R. Walker, (New York, 1962), pp. 99-100.

If a man spends a third of his life in direct contact with a mass-production environment, why should we not consider important (to him and to society) the hours of living time he spends inside the factory--as important and valuable, for example, as the product he produces which is consumed outside the factory? We talk of a high standard of living, but frequently we mean a high standard of consumption. Man consumes in his leisure, yet fulfills himself not only in his leisure but in his work. Is our mass-production work environment making such fulfillment more difficult?--Charles R. Walker and R.H. Smith, "The Men on the Assembly Line," Harvard Business Review (May-June, 1962), p. 72.

Advances in automation and integrated process equipment which require larger and larger fixed capital investments lead toward multiple-shift operations in both the factory and the office. In a very real sense the requirement that the worker and his family learn to adjust their pattern of living to shift work represents the ultimate in the demand that man adapt to a machine environment. --Floyd C. Mann, "Psychological and Organizational Impacts," Automation and Technological Change, ed. John R. Dunlop (Englewood Cliffs, N.J., 1962), p. 65. Copyright 1962 by The American Assembly, Columbia University, New York, New York. Reprinted by permission of Prentice-Hall, Inc., the publisher.

C. The Alteration of Traditional Basic Roles

....If the dominant figures of the past hundred and fifty years have been the entrepreneur, the businessman and the executive, the 'new men' are the research scientists, the mathematicians, the economists and the managers of the new computer technology; and the dominant institutions of the new society--in the sense of providing the most creative challenges and enlisting its best talents--will be the intellectual institutions. The leadership of the new society will not rest with the businessmen or the corporation as we know it (for production and most other elements of industry will have become routinized), but with the research corporations, the industrial laboratories, the experimental stations, and the universities. And the skeleton structure of that new society is already visible.--Daniel Bell, "The Post-Industrial Society," Liberty Mutual Life

Insurance Company Forum, Boston, June 14, 1962, quoted in Donald N. Michael, The Next Generation: The Prospects Ahead For the Youth of Today and Tomorrow (New York, 1965), p. 118. Reprinted by permission of the publisher, Random House, Inc.

Scientific and technological knowledge and its applications have brought new security, new comforts, new dignity within the reach of human beings. They have brought in sight the day of elimination of most kinds of unskilled hand labor--and have thus elevated the status and the dignity of the working man--if he is suitably educated to perform more skilled and more interesting tasks. They have also increased the need for and social importance of the highly talented and well-educated--the teachers, the scientists, engineers, doctors, lawyers, industrial managers. --Lee A. DuBridge, "Educational and Social Consequences," Automation and Technological Change, ed. John T. Dunlop, (Englewood Cliffs, N.J., 1962), p. 42. Copyright 1962 by The American Assembly, Columbia University, New York, New York. Reprinted by permission of Prentice-Hall, Inc., the publisher.

Those who seek to define leisure in opposition to work fail to account sufficiently for the interpenetration of work and leisure, for the many ways in which work and play are suffused. Their views imply that leisure is a reward for sweat--something that must be earned through productive effort, much as a beast of burden deserves food and a night's rest as a reward for the day's toil. Leisure need not be viewed as subordinate to work or as a restorative for work, but may be seen as an end in itself, something valued for its own sake....In setting leisure against work, the implication is that leisure is unproductive. Actually leisure is no less virtuous than work, nor is it necessarily opposed to work. Increasingly the distinction between the two has become tenuous. In fact modern society moves toward a fusion of labor and leisure. There is abundant evidence that work has become more like play and play has taken on the trappings of work.--Robert Lee, Religion and Leisure in America (New York, 1964), p. 29. Used by permission of the publisher, Abingdon Press.

The new age has the effect of forcing management to assume the role--conceptually--of a "machine designer." This master machine of business must fit an environment that has three dimensions: technical, economic, and social. What is more, intelligent "design" requires the integration of manufacturing, marketing, distribution, procurement, product design, and administrative activities. A team approach therefore is essential, and sophisticated techniques like simulation are necessary to explore complex relationships in planning and scheduling.--James R. Bright, "Are We Falling Behind in Mechanization?" Harvard Business Review (November-December, 1960), p. 106.

We have noted that management is still administering the engineers and scientist. But in every organization with an advanced technology the manager understands less and less about what is going on in the middle. As technologies change he never catches up. How many managements know what kinds of decisions they are delegating to their engineers and scientists--when they have made the decision to delegate at all? Many men in the upper levels of management do not really know the direction of research, and have not learned how to get information which will help them decide where the research ought to go.--Earl D. Johnson, "The Aerospace Industry," Technology and Social Change, ed. Eli Ginzberg (New York, 1964), p. 72-73. Used by permission of the Columbia University Press, the publisher.

A factory with its machinery, its community of operatives, its social service to the general population, its dependence upon organizing and designing genius, its potentialities as a source of wealth to the holders of its stock is an organism exhibiting a variety of vivid values. What we want to train is the habit of apprehending such an organism in its completeness.--Alfred North Whitehead, Science and the Modern World (New York, 1925), pp. 53-54. Used by permission of the publisher, The Macmillan Company.

In a broad sense, the problem of the repetitive worker is a special case within the larger problem area of overspecialization which exhibits itself in so many sectors and many levels of modern society. In industry the trend toward specialization of function has clearly tended to narrow in content, responsibility, and personal satisfaction a very large number of factory jobs. But to compensate for this shrinkage there would appear to be another trend of "expansion." Top management increasingly is obliged to assume broader and broader functions and responsibilities, portfolios and powers. Alexander Lindsay, the British philosopher, has remarked: "Industrialism has introduced a new division into society, the division between those who manage and take responsibility, and those who are managed and have responsibility taken from them. This is a division," he adds, "more important than the division between rich and poor."--Charles R. Walker, "The Problem of the Repetitive Job," Harvard Business Review (May, 1950), 58.

What does it mean in an advanced society when scientists and engineers can have no meaningful careers unless they are tied up in military technology? That's a new problem.--Earl D. Johnson, "The Aerospace Industry," Technology and Social Change, ed. Eli Ginzberg (New York, 1964), p. 76. Used by permission of the Columbia University Press, the publisher.

Automation....challenges the still prevalent management philosophy which states: (1) Break the work process down into the smallest possible components, (2) fit jobs into a rigid structure that emphasizes the duties and the boundaries of the job rather than its part in the process, and (3) put everyone possible on an individual or small-group incentive system, gearing pay to output on the particular job. This philosophy inevitably has tended to identify the individual with an ever more narrow task, giving him positive incentives to restrict his interests and no incentive at all to think beyond his immediate work environment.--George B. Baldwin and George P. Shultz, "Automation: A New Dimension to Old Problems," *Machines and the Man: A Sourcebook on Automation*, ed. Robert P. Weeks (New York, 1961), pp. 129-130.

It is plain that we have already drastically revised our notion of what constitutes work. More than half of our labor force is engaged in new kinds of nonproductive work as "providers of services." In this company of providers of services "nonproductive" is, of course, a fighting word. Each of us will argue that the terms "productive" and "work" must be given broader moral construction and technically more sophisticated meaning. To begin with, we can show that the providers of services include the scientists and engineers who have so vastly amplified the output of our producers of goods.--Gerard Piel, "The Acceleration of History," *Current Issues in Higher Education* (1964), p. 30.

The greater part of the foreman's activity in relation to his men may be looked upon as a spontaneous effort to supply the component indispensible for a successful organization--dignity of the individual. In the light of this record of the foreman's own efforts to solve the problem, what can the upper ranks of management, including top corporation management, do to assist him? Our answers would be:

1. Give priority in choosing foremen to those who have the skills which enable them to counterbalance anonymity with a personal relationship, to absorb excessive pressures, and to exhibit other characteristics of successful foremen....

2. See that the foreman, apart from his technical duties, has the *time* to establish such personal relationships, either by giving him less to do, or by teaching him to organize his time more effectively, or both.

3. See that there is sufficient continuity of employment of the work force so that more sustained and satisfactory relationships between men and supervision can develop.

4. See that all above the rank of foreman act toward them as the best foremen act toward their men, and especially see to it that the pressure from above is never so threatening as to transform the foreman from a leader into a driver.--Charles R. Walker et. al., "The Foreman on the Assembly Line," Modern Technology and Civilization, ed. Charles R. Walker (Cambridge, Massachusetts, 1956), p. 123. Used by permission of the publisher, Harvard University Press.

In the future, work will no longer be essentially a labor-payment to society but rather the full use of an individual's potential for the material benefit of his fellows and his own self-fulfillment. In the same way, leisure will no longer be time not spent in toiling but rather the full use of an individual's potential for the physical benefit of his fellows and his own recreation.--Robert Theobald, "The Political Necessities of Abundance," Extracts from a paper prepared for the Georgetown University Conference on Poverty-in-Plenty, November 16, 1965.

D. The Opportunities of Abundance

Achievement motivation is in part responsible for economic growth. Such a statement sounds either untestable or trivial. What could be more obvious than that great achievements are motivated by strong desires to achieve on the part of at least some people in a culture?--David C. McClelland, The Achieving Society (Princeton, N.J., 1961), p. 36. Copyright 1961 by the publisher, D. Van Nostrand Company. Used by permission of the publisher.

The only method of preserving both free men and free markets is to recognize the need for breaking the job-income link: That the economic system needs to divorce the productive function from the distributive function, and thereby allow each to work in a way which will be of maximum benefit to society.--Robert Theobald, "Free Men and Free Markets," AAUW Journal (May, 1964), p. 176.

....leisure time becomes a time when men are at their best, making it possible for them to maintain that state in the future. When they return to work, the level of maturity and control that they have managed to reach in leisure will affect the tone of what they then do. Though the enhancement of one's work is not the objective of leisure time, work is an inevitable beneficiary, but only because and so far as it is being engaged in by a more complete man.--Paul Weiss, "A Philosophical Definition of Leisure," ed. James C. Charlesworth, The Annals of The American Academy of Political and Social Science (April, 1964), p. 29.

We must....reject the copybook notion that work is its own reward and substitute the doctrine (which fits the new age of plenty) that we work in order to enjoy leisure.--James C. Charlesworth, "A Comprehensive Plan for the Wise Use of Leisure," ed. James C. Charlesworth, The Annals of The American Academy of Political and Social Science (April, 1964), pp. 35-36.

An adequate distribution of the potential abundance of goods and services will be achieved only when it is understood that the major economic problem is not how to increase production but how to distribute the abundance that is the great potential of cybernation. There is an urgent need for a fundamental change in the mechanisms employed to insure consumer rights. An industrial economy system postulated on scarcity has been unable to distribute the abundant goods and services produced by a cybernated system or potential in it.--The Triple Revolution, Memorandum to Lyndon B. Johnson, March 22, 1964, p. 7. (Reproduced in The Automated State, by Robert MacBride, Chilton Book Company, Philadelphia, 1967, p. 196.

....Negroes, who can never become a major factor in technology from the vocational aspect, will become a major factor in determining the final disposition of the results of technology, i.e., in the revolutionary and political area where decisions will be made that govern the use of things rather than how they are to be produced. And these are the most important decisions in a cybernated society.--James Boggs, "The Negro and Cybernation," The Evolving Society, ed. Alice Mary Hilton (New York, 1966), p. 170. Used by permission of the publisher, the Institute for Cybercultural Research Press.

It is clear that we need to change our attitudes about all these matters: About the value of work, when it is merely repetitive toil, easily performed by a machine; about our responsibilities to those who are no longer needed to perform this toil, and how they should be included in a society of abundance as fully participating members; about the fact that those currently unemployed should have the means and the opportunity to be doing something with their time; about the real scarcities, not the manifestly abundant goods and services; about where the productive effort of society should be directed.--Robert Theobald, "Free Men and Free Markets," AAUW Journal (May, 1964), p. 177.

In an abundant society the problem is not an economic one of keeping the machine running regardless of what it puts out, but a political one of achieving the common good. And planning is one of its major means.--W.H. Ferry, "Caught on the Horn of Plenty," Bulletin of the Center for the Study of Democratic Institutions (January, 1962), p. 7.

> We have to invent and apply a new economics based on the fact of abundance rather than the assumption of scarcity. This means we must give up our age-old ambition of full employment and develop an economy where it is recognized that a large portion of the population will always be unemployed. It must also be recognized that these people must live in such a way that they are valuable contributors to the society and maintain their own self-respect.--Donald N. Michael, "Technological Innovation: Threat or Promise," Address delivered at the Conference on Technological Change and Human Values, sponsored by the Center for Continuing Liberal Education, College of the Liberal Arts, The Pennsylvania State University (University Park, Pennsylvania, December 4-6, 1963), p. 4.

> For the first time in the history of mankind, it is feasible for *all* men to find the *Good Life* and for human societies to become *humane* societies. The inevitable conflicts of the past--caused by the demands for sacrifices from some to benefit many, or *vice versa*, and the need to divide scarce commodities and distribute innumerable disagreeable jobs--are obsolescent now. The new age may bring many of its own conflicts that we cannot foresee. We can only be certain that the conflicts will be different from ours and hope that they will be less bitter and ugly and degrading.--Alice Mary Hilton, "The Bases of Cyberculture," *The Evolving Society*, ed. Alice Mary Hilton (New York, 1966), p. 16. Used by permission of the publisher The Institute for Cybercultural Research Press.

III THE SHAPE OF THE COMMUNITY

To confront still another aspect of our increasing technological sophistication, we should examine the proposition that technology seems to have the ability to stratify society and to isolate various groups within our work force and population. For example, we realize that automation can speed the work of the assembly-line functionary (all but eliminate, in fact, the actual physical labor he must contribute), expedite the tasks of a clerical and secretarial staff to an extent undreamed of a decade ago, and increase the ability of a supervisor (whether he is an officer of a private corporation, a member of the upper echelon of the government bureaucracy, or a foreman-liaison) to control the work done by those under his supervision.

Technology lightens the work, to be sure. But, at the same time, it introduces itself into the work scheme, and its presence can raise a barrier to inter-personal relationships between and among the various groups comprising the businesses of producing goods or providing services. The more the machines themselves emerge as an integral part of the process, the fewer opportunities a worker enjoys to meet an interested face, engage in conversation, and exercise some meaningful function in the process: similarly, the less likely management is to meet its subordinates and to comprehend, in any potentially constructive way, the frustrations and difficulties, as well as the rewards, inherent in the work it requires to be done.

Chances for recognition, praise, and encouragement--needs bound inextricably with the meaning of life itself--diminish and, with them, the incentive to make a contribution and the motivation to maintain an interest in the work.

What pleasure can a man derive from doing a job if he cannot understand its importance or observe its results? And if this denial of satisfaction is a growing implication in our technology, what will be the effect in the future of much more imaginative technological refinement upon an individual's inclination and ability to inquire, to make the important decisions in his life, to participate in the affairs of his community, and to evaluate the democratic processes by which he governs himself?

Whether for good or ill, our economic system has taught its workers to defer to the judgments of those in command. What will the effects be if the same high percentage of our people are taught, throughout their eight-hour workday, to defer to the dictates of machines?

A. The Outlook for Democratic Values and Institutions

> The high degree of specialization and technical complexity that characterizes the advanced economy has serious consequences for several aspects of life, of which the most obvious is probably politics. Democracy is ruled by dilettantes--a dilettante government controlled by a dilettante Congress, itself controlled by a dilettante electorate--dilettantes not in any

derogatory sense but in the sense of not being experts in the various fields on which they have to pass judgment. With increasing specialization, however, and with the increasing technical complexity of each field of specialization, dilettante rule becomes more difficult and more dangerous.--Tibor and Anne Scitovsky, "What Price Economic Progress?" Readings in Economics and Politics, ed. H.C. Harlan (Fair Lawn, N.J., 1961), p. 705.

Monotony in work and in off hours is a social danger no less than disease, disorders and illiteracy. Our failure to embrace this belief is raising the crime rate, increasing the population in mental hospitals, multiplying the physical and moral weaklings rejected by the armed forces, and raising the percentage of youths who want security at the very onset of their careers and who are afraid of trial and adventure.--James C. Charlesworth, "A Comprehensive Plan for the Wise Use of Leisure," ed. James C. Charlesworth, The Annals of The American Academy of Political and Social Science (April, 1964), p. 34.

There is another way in which changes in technology are likely to have broad human and social implications. When a group in society finds itself dispossessed, a degree of rancor sets in. As technical competence becomes increasingly the criterion for a position in society, for advancement, for mobility, an increasing number of specific groups may become dispossessed. This course will create social tension. The growth of the radical right among certain elements in the military establishment and in business life in America may be a product of this kind of dispossession. The intellectual society of the future is not going to be a neatly arrayed scheme wherein the hierophants of science rule in a very calm way, as Wells predicted. Rather, it will be a society in which strains may increase and the political counterparts of these strains become more rancorous.--Daniel Bell, The Post-Industrial Society," Technology and Social Change, ed. Eli Ginzberg (New York, 1964), pp. 39-40. Used by permission of the Columbia University Press, the publisher.

[There] is the tendency for the planners, the doers, for the decision makers, to become isolated from the rest of society because of the power and potence and utility of the computers, of cybernation, to come to value those things which the computer can deal with. This is the answer to the people who say, we can always pull the plug if you don't like what the computers come up with.--Donald N. Michael, "Technological Innovation: Threat or Promise," Address delivered at the Conference on Technological Change and Human Values, sponsored by the Center for Continuing Liberal Education, College of the Liberal Arts, the Pennsylvania State University (University Park, Pennsylvania, December 4 6, 1963), p. 3.

The evil of intense specialization is associated with another--that of mass spectation. Thousands of people watch a few professionals perform, themselves discouraged from engaging in any recreation activity because they do not possess some skill in superlative degree. Herein dwells a dark threat to American democracy, for, if people are trained to sit and watch professionals in sport and other leisure activities, they will also sit and watch some ambitious busybodies take their government away from them and operate it. Mass-sport spectacles in Central Europe are not unrelated to recurring dictatorships there. And, when the Battle of Waterloo was won on the playing fields of Eton, it was won by boys *every one* of whom was compelled to participate in games. We should learn a lesson from the cancerous Roman circuses. The democratic way of life must be catabolic; spectation is anabolic.--James C. Charlesworth, "A Comprehensive Plan for the Wise Use of Leisure," ed. James C. Charlesworth, *The Annals of The American Academy of Political and Social Science* (April, 1964), pp. 39-40.

One of the central problems of the future is the fragmentation of society. This will not be just an economic problem. Those who lack understanding of the new society and do not have a sense of involvement are going to be dispossessed. We should be interested not just in what happens to the economy but in what happens to the people who have a tradition of how a democratic society should work and feel that somehow it is failing. It is not clear that providing people with a scientific education will be a sufficient remedy for this kind of problem.--Daniel Bell, "The Post-Industrial Society," *Technology and Social Change*, ed. Eli Ginzberg (New York, 1964), p. 54. Used by permission of the Columbia University Press, the publisher.

It may be that the handmill 'gave' us society with the feudal lord and the steam-mill society with the industrial capitalist. Do the computer and the atom then give us society with the commissar?....to a growing degree the process of technological change is no longer the spontaneous product of market forces but the deliberate creation of public or quasi-public effort. Thus the problem of the *control* over the entry of technology becomes, at least on the surface, more amenable to public decision. Perhaps this slow drift toward socialization of technological change opens the way for a new examination of social policy in the guidance of the technological revolution. --Robert L. Heilbroner, "The Impact of Technology: The Historic Debate," *Automation and Technological Change*, ed. John T. Dunlop (Englewood Cliffs, N.J., 1962), pp. 21-23. Copyright 1961 by The American Assembly, Columbia University, New York, New York. Reprinted by permission of Prentice-Hall, Inc., the publisher.

As cybernation advances, new and profound problems will arise for our society and its values. Cybernation presages changes in the social system so vast and so different from those with which we have traditionally wrestled that it will challenge to their roots our current perceptions about the viability of our way of life. If our democratic system has a chance to survive at all, we shall need far more understanding of the consequences of cybernation. Even the job of simply preserving a going society will take a level of planning far exceeding any of our previous experiences with centralized control.--Donald N. Michael, Cybernation: The Silent Conquest, a report to the Center for the Study of Democratic Institutions (Santa Barbara, California, 1962), pp. 13-14.

Proof of the democratic tendencies of advancing technology is also to be seen in the progress toward integration in the southern United States. There the development of a new industrial South has created tensions between the old and the new order, yet it is bringing an end to inequality. Lest we think that this situation is peculiar to our own country, may I also point out that the demands of a modern industrialized society in India have breached the caste system in many places. Can it therefore be said that advancing industrialization represents a threat to human freedom?--Melvin Kranzberg, "Technology and Human Values," The Virginia Quarterly Review (Autumn, 1964), p. 585.

To speak today of the defense of democracy as if we were defending something which we knew and had possessed for many decades or many centuries is self-deception and sham--mass democracy is a new phenomenon--a creation of the last half-century. It is inappropriate and misleading to consider [it] in terms of the philosophy of Locke or of the liberal democracy of the nineteenth century. We should be nearer the mark, and should have a far more convincing slogan, if we spoke of the need, not to defend democracy, but to create it.--Edward Hallett Carr, The New Society (London, 1960), pp. 75-76.

B. The Place of the Individual and the Role of the Group

The question today is not that which a conservative philosopher might pose: Is the community being subjected to too much innovation? It is rather whether innovation has not been of a kind which menaces the concept of community itself. It is not whether we are to have a different kind of culture, but whether we are going to have a culture at all--in the sense of a common life which has meaningful values capable of being handed down from one generation to the next.--August Heckscher, The Public Happiness (New York, 1962), p. 26. Used by permission of Atheneum, the publishers.

Computers are especially useful for dealing with social situations that pertain to people in the mass, such as traffic control, financial transactions, mass-demand consumer goods, allocation of resources, etc. They are so useful in these areas that they undoubtedly will help to seduce planners into inventing a society with goals that can be dealt with in the mass rather than in terms of the individual.--Donald N. Michael, Cybernation: The Silent Conquest, a report to the Center for the Study of Democratic Institutions, (Santa Barbara, California, 1962), p. 37.

The illusion that increased mechanization will automatically lead to increased devaluation of the individual and to increased manifestations of dehumanization must be abandoned. Automation will be a blessing if man can create those institutions or revise those habits of thought which are apt to degrade him into a slave of the machine rather than its master. Whether electronic computers will carry out a thermonuclear war for or against their masters or whether they will be employed to program the most fantastic expansion of goods and services ever experienced is still not up to any decision-making computer, no matter how advanced it may be. Man alone will be the one who feeds the program into the computer and makes the crucial decisions. Reasonable man will be able to greet the age of cyberculture with ecstatic enthusiasm, realizing that it sets him free to devise ever more effective schemes to ease the burdens of living and to bring every single problem mankind has ever faced closer to its successful solution.--Joseph Garai, "Our Concept of Man: Rational or Reasonable?" The Evolving Society, ed. Alice Mary Hilton (New York, 1966), p. 264. Used by permission of the publisher, The Institute for Cybercultural Research Press.

In the tragic view of life it is the individual, proudly exalting his tragic flaw, who faces Fate and suffers a fall. In the modern world it is more likely the large human organization which shape the destinies of our time and through or against which the individual must establish his roles.--Charles R. DeCarlo, "Perspectives on Technology," Technology and Social Change, ed. Eli Ginzberg (New York, 1964) pp. 12-13. Used by permission of the Columbia University Press, the publisher.

These deepening dilemmas of interpretation and action will lead to more polarization of personal solutions. Some will find themselves searching more deeply for a moral basis for action: some will find a moral basis for dogmatism, some for relativism. Some will opt out, turning to private preoccupations. Others, especially among those who rise to power, will obsessively pursue the same techniques which we like to think have produced our successes: the calculated manipulation of environment and man by the exploitation of technology and organization.--Donald N. Michael, The Next Generation: The Prospects Ahead for the Youth of Today and Tomorrow (New York, 1965) pp. 156-157.

Cybernation provides the potential for unlimited freedom--but we can only grasp the potential for freedom in a totally new form of society. It is necessary to create a new type of society in which an individual will be given a chance to develop his personality completely. We need a new type of society based on respect for what the individual is: not on the color of his skin or his existing position in society. We need a new form of society which condemns selfishness and lying under whatever names they may be disguised.--Robert Theobald, "Human Rights in a Cybernated Age," The Educational Record (April, 1964), p. 120.

C. The Conflicting Demands of Freedom and Responsibility

From a technological point of view automation is working; but the same thing cannot be said so confidently from the human point of view. The technologists have done and are doing their job. They have developed and are developing equipment that works miracles. But, as is too often the case in this age of the widening gap between scientific progress and man's ability to cope with it, we have failed to keep pace. This general failure to face these problems, the attempt in many places to avoid them, to my way of thinking, represents a national moral weakness in itself; and I further believe that it can be an indication of a common failure to judge and understand the severe nature and extent of the thrust of this technological revolution. In the coming months and years, if we are to survive as a nation, we will need new sociological and economic ideas to solve the problems we face in this area.--John I. Snyder, Jr., Prepared Statement before the Subcommittee on Employment and Manpower of the United States Senate Committee on Labor and Public Welfare, Eighty-eighth Congress (Washington, D.C., October 3, 1963), p. 1650.

Faith in science and technology coupled with a reluctance to face their social consequences are representative of an enduring pattern in American thought.--Morrell Heald, "Technology in American Culture," Stetson University Bulletin (October, 1962), p. 6.

All these developments, the development of science, technology and industry, and their interpenetration, are but different aspects or ramifications of one evolutionary process; all of them lead eventually to collectivism and deindividualization. They split or invalidate the individual in various ways: apart from scientification, through specialization, functionalization, standardization, anonymization. The chain reaction released by collectivizing rationalization, inherent in science, technology and industry, starts with specialization. Specialization involves functionalization; functionalization brings about standardization--these are the three primary carriers of collective controls. And by means of these consecutive effects rationalization paradoxically ends up....in depriving the individual of his rational faculty.--Erich Kahler, The Tower and the Abyss (New York, 1957), p. 22.

Our question is: What activities will or should replace the bulk of the behavior for which human nature has been designed and motivated, when that behavior becomes obsolete, meaningless or dangerous? We might find it difficult to get ready for this even if we had 2,000 years. We had insights more than 2,000 years ago that we should beat our swords into plowshares. We have not yet succeeded. And possibly the technology of the atomic sword has already made our efforts to reform our moral and spiritual values too little and too late.--Ralph Wendell Burhoe, "The Impact of Technology and the Sciences on Human Values," Automation, Education, and Human Values, eds. William W. Brickman and Stanley Lehrer (New York, 1966), pp. 124-125.

It is not that the citizen as consumer is stupid but that the institutional arrangements today are such that he cannot make rational economic choices. He has been raised on the doctrine that his selfish interest is paramount. He is the object of billions of dollars worth of advertising and publicity. He has been told by two presidents that it is patriotic duty to buy, buy almost anything, it doesn't matter, as an act of public welfare. It displays the poverty of our political imagination and institutional arrangements when the highest office in the land is used to dole out such irrational advice. What kind of advice is this to give to a nation needing public improvements in its every part? Arnold Toynbee was serious when he remarked recently that Madison Avenue is a worse threat to our civilization than communism.--W.H. Ferry, "Caught on the Horns of Plenty," Bulletin of the Center for the Study of Democratic Institutions (January, 1962), p. 6.

For some years at least, most youth will not find at home, at school, or in any other institution that helps to guide them a set of values that will significantly reduce the present confusion and over-all inadequacy of perspectives, standards, aspirations, and goals. Most people will probably not be much better able to participate in the resolution of society's problems than they are now, and the percentage interested in doing so will not be much greater. Indeed the gap between the concerned and the indifferent is likely to enlarge.--Donald N. Michael, The Next Generation: The Prospects Ahead for the Youth of Today and Tomorrow (New York, 1965), p. 186.

As professions subdivide, each group of specialists finds it increasingly possible to "pass the buck" for the social consequences of their work....When appalled by the resulting social dislocations, each specialist, secure in the knowledge that he has performed his task to the best of his ability, can readily disclaim responsibility for them. And, of course, no one group of specialists, the engineer any more than the others, alone initiates these consequences. Rather, within our economic and social structure each technological contribution meshes into a cumulative pattern of effects, some of which none has desired and all have brought about.--R.K. Merton, "The Machine, the Worker, and the Engineer," Modern Technology and Civilization, ed. Charles R. Walker (Cambridge, Massachusetts, 1956), p. 409. Used by permission of the publisher, the Harvard University Press.

When power becomes absolute, values disappear. When man is able to accomplish anything at all, there is no value which can be proposed to him; when the means of action are absolute, no goal of action is imaginable. Power eliminates, in proportion to its growth, the boundary between good and evil, between the just and the unjust.--Jacques Ellul, "The Technological Order," Technology and Culture (Fall, 1963), p. 402.

D. The Path to the Future and the Necessity for Choice

....as our system of automation becomes more perfect, the less possible it is to intervene in the process, to alter its pace, to change its direction, to limit its further extension, or to reorient its goal. Automation has a colossal qualitative defect that springs directly from its quantitative virtues: It increases probability and decreases possibility. Though the individual component of an automatic system may be programmed like a punch card on a motor assembly line to deal with variety, the system itself is so fixed and rigid that it seems in fact little more than a neat mechanical model of a compulsion neurosis. This system can operate in fact with only one set of goals, purely quantitative goals unrelated to the organic capacity or human need--faster and faster, further and further, bigger and bigger, more and more.--Lewis Mumford, "The Automation of Knowledge," Current Issues in Higher Education (1964), p. 13.

I believe that it can be demonstrated that full employment is an absolute requirement for the continued operation of our present system, that it is at least possible that cybernation will make full employment infeasible in the near future, and that we must therefore develop an alternative policy in the form of a practical measure, which would be effective if the conventional wisdom proves incorrect when applied to the new conditions created by the impact of cybernation.--Robert Theobald, "Income Provision in a Cybernated Era," Congressional Record, Washington, D.C. (July 8, 1964), p. 16120

Who has the right to manage whom? And toward what ends should human capacities be directed?...As the managerial elite of any particular country gathers experience and expertise, reduces new areas of human activity to its control, and integrates partial plans into a national (or transnational) whole, the bureaucratic machine exercising such powers becomes increasingly automatic, with goals built into its very structure. The administrative machine, like other specialized instruments, can only do what it was built to do...A really massive bureaucracy, such as those which now constitute every major modern government, becomes a vested interest greater and more strategically located than any private vested interest of the past. Such groupings are characterized through elaborate rules and precedents, and procedures rising toward the semisacredness of holy ritual. These buttress a safe conservatism of routine and make modern bureaucracy potentially capable of throttling back even the riotous upthrust of social and technical change nurtured by modern science. Consequently, as the corporate entities of government bureaucracies grow and mesh their activities more and more perfectly one with another, both within and among the various "sovereign" states of our time, use and wont--the way things have "always" been done--may become, bit by bit, an adequate surrogate for social theory. By sustaining an unceasing action, administrative routine may make rational definition of the goals of human striving superfluous.--William H. McNeill, "Dilemmas of Power," The Saturday Review (November 2, 1963), pp. 50-51. Originally, this article appeared in the University of Chicago Press book, The Rise of the West (1964).

Justifiably or not, for many scientists and non-scientists the only hope for human survival lies in the expectation that before long science will be able to control not only nature, but mankind. Men's minds and characters are expected to be predetermined to a large extent before birth by genetic control, and to be manipulated and shaped thereafter by behavioral engineering. Thus, presumably, there will come into being new men, a new society, a new religion--i.e., a new and better world.

--Harold K. Schilling, "Notes on Science and the Shape of Things to Come," Resource Paper for the Seminar on Work, Leisure and Education in a Changing Industrialized Democracy, sponsored by the Center for Continuing Liberal Education, College of the Liberal Arts, The Pennsylvania State University (University Park, Pennsylvania, June 3-5, 1964), p. 2.

Man's ascending mastery over the forces of nature has progressively transformed not only the relationships of man to nature, but the relationship of man to man. From age to age, discovery and invention have opened a new scope and possibility to human life. With each new possibility has come the necessity to choose. In the succession of choices, the moral and the social order have evolved. The now steeply accelerating advance of science allows no time for evolution. We are compelled to an immediate re-examination and deliberate overhaul of the values and institutions that we have carried into the present from the swiftly receding past.--Gerard Piel, "The Acceleration of History," Current Issues in Higher Education (1946), p. 23.

Countries outside the U.S. are doing little to prepare for the problems automation will bring....There is a similar lag in thinking about what the effects of automation may be. There is some general awareness that jobs may shrink, skills become obsolete, whole industries decline. But little foresight is being applied to these potential problems. Little planning is being done--although academic circles in Western Europe raise the issue that better foresight and planning might have avoided unemployment problems in the U.S. and Canada.--"Automation Doesn't Scare Europe," Business Week Magazine. (December 22, 1962), p. 36. Used by special permission.

The state of equilibrium that has characterized nature for a long time is turning into one of instability. Natural resources are disappearing at a fantastic rate. The atmosphere is being poisoned. In relation to the animal world man has become a cruel predator. The natural checks and balances limiting human population have been largely removed, so that we are now in the midst of an ominous population explosion. We have unlocked the door to useful nuclear energy, but are now in grave danger of nuclear war and of disintegration of the world.--Harold K. Schilling, "Notes on Science and the Shape of Things to Come," Resource Paper for the Seminar on Work, Leisure and Education in a Changing Industrialized Democracy, sponsored by the Center for Continuing Liberal Education, College of the Liberal Arts, The Pennsylvania State University, University Park, Pennsylvania, June 3-5, 1964), p. 2.

> How can we derive the maximum benefits of technological change and still make the appropriate social adjustments without endangering basic freedoms and human dignity? The answer is not a simple or a quick one. First and foremost, we must clearly recognize what has encouraged technological advances in our past and made us the most productive nation in history. The magic ingredient is our competitive enterprise environment, the most powerful force ever known for stimulating individual and cooperative efforts to make innovations for the benefit of mankind.--Thomas J. Watson, Jr., "Technological Change," ed., The American Assembly, Goals for Americans (Englewood Cliffs, N.J., 1960) p. 199. Reprinted by permission of Prentice-Hall, Inc., the publisher. Copyright 1960 by The American Assembly, Columbia University, New York, New York.

> Scientists are encouraged by the society to hide behind test tubes and atom smashers and corporate public relations officers they are to stick to research into "neutral facts" rather than engage in a search for truth. No concept of science could be more foolish or more disastrous. A scientist does not present society with neutral facts, but with miracles; it is the truth of knowledge that is in all discoveries; and all technological inventions are amoral because they have an inherent power both for good and evil. Human beings may choose between using the fruits of the human mind for good or for evil. We cannot abdicate to the machine we made in our own image our right--or, rather, our duty--to choose between good and evil. For in the very attempt of abdicating our duty and our right to choose, we are making a choice; and we would continue to bear full responsibility for that choice.--Alice Mary Hilton, "The Bases of Cyberculture," The Evolving Society, ed. Alice Mary Hilton (New York, 1966), p. 21. Used by permission of the publisher, the Institute for Cybercultural Research Press.

IV. THE NATURE OF THE GOOD LIFE

If "the good life" is in sight, our greatest and most immediate concern should be the way we choose to approach it, since it will not, like a ripe apple, fall into our laps when it is ready to be enjoyed. Part of our approach should properly consist of a continuing serious examination of the problems presented by the lengthening, cacophonous parade of our own technological achievements. For it is our technology, which for the moment bends to our commands, that can smooth our approach to the goal or, as easily, divert us from it.

We obviously cannot eradicate the problems posed by technology with a cursory, dictatorial edict, but certainly we are more likely to realize its promises if we work carefully in compassionate concert with the rest of society, many members of which harbor values far different from our own. While jointly striving to raise the dignity and preserve the humaneness of mankind, we must, as individuals, accept and find ways to support the person who, in Robert Theobald's words, "likes a job in a factory, wishes to produce better goods and services, wishes to teach, wishes to work on an abstruse scientific problem whose solution appears useless, wishes to beautify his garden or a corner plot, wishes to back unpopular causes."*

It is probable that, as in a calculus problem where one can only approach but never really attain a theoretical limit, we will never actually achieve "the good life." But, again as in calculus, it can be immensely useful and even imperative to work toward it. Clearly education--more and more of it pursued later and later into middle age--can help; the thoughtful use of leisure time will help too; and, as Robert Theobald suggests, an understanding of and an affinity for our fellow man and his aspirations can prove invaluable in the quest. Perhaps one can recognize in these approaches to the goal components of the goal itself, each a part of what we might logically expect from "the good life."

The concern of the writers of this last set of "needles and burrs" is that we focus our attention on some of our present attitudes toward education, work and leisure, our cultural heritage, and our environment in order to discern ways in which these things must be altered to facilitate the approach to "the good life." It is important to notice also the way our technology can alter these concepts for us. Having studied this aspect of technology, possibly we will better understand the implications it holds for human values.

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*"Human Rights in a Cybernated Age," Educational Record (Spring, 1964), p. 120.

A. The Technological Impact on Traditional Human Values

Technology is a ruthless tyranny and its processes demand from the educational system a training directed exclusively toward conceptual modes of thought. "Money, mechanization, algebra. The three monsters of contemporary civilization." So wrote Simone Weil.--Sir Herbert Read, "Art and Life," The Saturday Evening Post (September 26, 1959), p. 104.

....we are forced to recognize a double threat: (1) that, while the new technological civilization requires higher levels of religious values than less technological societies, we find our traditional religious supports of values crumbling; and (2) that the sciences which have bred our technology are at the same time perhaps the primary source of man's disillusionment with his religious beliefs. This fact has been copiously and mournfully noted in our Western culture since the time of Galileo, and is now obvious throughout the world.--Ralph Wendell Burhoe, "Human Values in an Age of Science and Technology," Current Issues in Higher Education (1964), p. 34.

Unlike science, technology concerns the applications of science to the needs of man and society. Therefore technology is inseparable from humanism.--Sir Eric Ashby, "Technological Humanism," Journal of the Institute of Metals, LXXXV (1957), p. 465.

Our poets have let us down badly in interpreting our times to us. By refusing to consider the impact of science and technology, our men of letters are carrying on their only intellectual life in a cultural vacuum. It is no wonder that they can communicate only with one another--and they complain that they feel alienated from a society whose culture they refuse to attempt to understand.--Melvin Kranzberg, "Technology and Human Values," The Virginia Quarterly Review (Autumn, 1964), p. 588.

Unconsciously, the human realm is denied in favor of the world of pure technics. Man, the tool-user, grows convinced that he is himself only useful as a tool, that fertility except in the use of the scientific imagination is wasteful and without purpose --even, in some indefinable way, sinful.--Loren Eiseley, "The Illusion of the Two Cultures," The American Scholar (Summer, 1964), p. 389.

At present, education means nothing in the U.S.; it is a vast personnel system for the use of employers....a technology assisting a technology.--Robert M. Hutchins "Achieving a Perspective on the Technological Order," Technology and Culture (Fall, 1962), p. 645.

The Negro revolution is not a political event that just happened to happen now. It comes at a time when mechanization of the cotton field and factory makes it impossible for uneducated Negroes to continue to live by subhuman toil. If they are not to die as dependent as slaves, they must fight for the right to more desirable work. This means they must fight for their right to be schooled and their right to access to the middle-class niceties associated with more desirable work. The civil-rights movement is one of the clear-cut evidence of how machines not only permit the wider flourishing of higher human values, but indeed require them to flourish more widely.--Bernard Asbell, The New Improved American (New York, 1965), p. 212. Used by permission of McGraw-Hill Company, the publisher.

"Culture is activity of thought, and receptiveness to beauty and humane feeling. Scraps of information have nothing to do with it."--Alfred North Whitehead.

THE AGE OF CYBERCULTURE

The age of cyberculture must be built by the entire corpus of human knowledge and human achievement--by an interaction of the arts, the sciences, and the philosophies. Science without a philosophical contemplation of the world is dangerous, and philosophy without understanding the power of modern science is foolish. And neither science nor philosophy can flourish without the understanding and appreciation of the harmony and beauty that is art. Moral conviction, as ethical system, or religion--the terminology is not nearly as important as the idea--must be the basis of all our endeavors lest the potential heaven of nuclear energy become a certain hell, and the potential world of leisure and abundance become the nightmare of Schlarafenland.--Alice Mary Hilton, "The Bases of Cyberculture," The Evolving Society, ed. Alice Mary Hilton (New York, 1966), pp. 19-20. Used by permission of the publisher, the Institute for Cybercultural Research Press.

Taking society as a whole, the result of the transition from horses to cars has been an increase in human softness.... What is usually called progress also entails what is usually called degeneracy....Cease to use your hands, and you have lopped off a huge chunk of your consciousness....Mechanization leads to the decay of taste, the decay of taste leads to the demand for machine-made articles and hence to more mechanization, and so a vicious circle is established.--George Orwell, The Road to Wigan Pier (London, 1937), p. 218.

What could be at once more patronizing and more bankrupt than the claim that the flood of swill daily pumped through our cultural pipelines fairly represents all that the ordinary man can ever be expected to appreciate? If it is true that this capitalist society has all but wiped out economic degradation and oppression, why can it produce only consumers assertedly hungry for cultural products as degraded as those of any previous epoch of human history? The fantastic technological and scientific advances of recent years--not the singular product, we see now all too clearly, of American capitalism--do not merely call for an accompanying cultural advance, up to now unobservable among us; they will be positively insupportable without such an advance, without a new definition of the meaning of culture and of the individual human potential. --Harvey Swados, A Radical's America (Boston, 1962), p. 72. Used by permission of Little, Brown and Company, the publisher. This passage appeared originally in Monthly Review.

Instead of striving for leadership through moral initiative, modern man has developed a kind of Gallup poll mentality, a mechanistic conception of relying on quantity instead of quality and yielding to expediency instead of building a new faith.... We are stigmatized by an irrelevant slip-cover civilization as things stand now, and our sense of duty turns into a timid and insipid attitude which too often accepts imitative cosmetic treatment as a substitute for a creatively conceived design which would grow from the very bones of a building, or of an industrial product.--Walter Gropius, "Architecture and Education," Address delivered at Williams College, Williamstown, Mass. Reported in The New York Times, September 23, 1963, Section C, p. 31.

Economic progress itself influences and changes man's aspirations. It has wrought cultural and social changes that divert time and energy from intellectual pursuits and "idle" speculation, lower the prestige of learning, and diminish the availability of channels for intellectual discussion and the dissemination of new ideas. These costs of economic progress in our society are less tangible but no less real than the purely material costs of the resources invested in plant, equipment, scientific research, training, and whatever else contributes to expanding and improving productive capacity.--Tibor and Anne Scitovsky, "What Price Economic Progress?" Readings in Economics and Politics, ed. H.C. Harlan (Fair Lawn, N.J., 1961), p. 705. Used by permission of the publisher, the Oxford University Press.

The pivotal force in the development of culture is now in the hands of the doers rather than the thinkers and the centers are now the great corporations rather than the universities. It is in these new centers that new directions are charted. The danger that the entire culture may become technological is obvious. Even in the recent past the intellectuals, the professional intellectuals, know that they were the leaders of thought. But the doers are assuming this role and are doing a better job than the intellectuals.--Charles R. DeCarlo, "Perspective on Technology," *Technology and Social Change*, ed. Eli Ginzberg (New York, 1964), p. 39. Used by permission of the publisher, Columbia University Press.

The further technical progress advances, the more the social problem of mastering this progress becomes one of an ethical and spiritual kind. In proportion to the degree that man extricates himself from the domain of the material, dominates it, and multiplies thereby the means of exploiting the matter, the problem ceases to be one of human possibilities and limits and becomes one rather of knowing which man (or group of men) will exploit technical means, and what will be the enabling moral and spiritual qualities.--Jacques Ellul, "The Technological Order," *Technology and Culture* (Fall, 1962), pp. 408-409.

There are many artistic crises in American society that seem, to the layman at any rate, to be soluble only in economic terms. For example, if a humanist knows, as I do, that the esthetic level of architectural design is depressed largely because of the conservative and unenlightened tastes of the policymakers in our financing institutions, then he must ask himself how the FHA'S influence on mortgage monies can be ameliorated....The good life, the specialist in the humanities begins to see, derives its special qualities from the kinds of 'goods' that can be produced and distributed in our economy. --Patrick D. Hazard, "Think of Taste Before Taxes," *Readings In Economics and Politics*, ed. H.C. Harlan, (New York, 1961), p. 722.

B. The Components of a Humane Civilization

In the years ahead there will be growing debate about the purpose of schooling beyond education for jobs or the national interest, and about how to educate to realize these purposes. Most fundamental will be the continuing and growing debate about the proper role of education in inculcating values and behavior appropriate to each of the occupational categories in a rapidly changing, complex, and contradictory world. Over the next twenty years this debate about the proper values for youth--who when they grow up will live in a world quite different from the world their elders know and can understand--will be carried on by parents and leaders, most of them trained by the past. It will be an intense debate and a partisan one, since we will continue to be unclear about the kind of world we want and what education we wish to emphasize for those ends. Unless we choose the garrison state as our preferred means for seeking preferred ends, this confusion will probably increase as our world becomes more complex.--Donald N. Michael, The Next Generation: The Prospects Ahead for the Youth of Today and Tomorrow (New York, 1965), p. 107.

When the compassion of the liberal and the prudent practicality of the conservative unite in a quest that befits them both--a search for ways to invest in the improvement of the abilities of our own people--we will have begun to fulfill the highest purpose not only of the machine, but of man, who invented it and was elevated by it.--Bernard Asbell, The New Improved American (New York, 1965), pp. 213-214. Used by permission of McGraw-Hill Book Company, the publisher.

Education in its broadest sense is the process of enabling a person to live in his own society.--Robert Theobald, The Challenge of Abundance (New York, 1961), p. 97.

Many American businessmen are finding a new interest in the humanities for the wrong reasons. They have discovered that the liberal arts major is a better leader than the narrowly trained technician....But the humanities are not valuable because they serve the manipulative functions of modern bureaucracy. Their real worth lies in the objective criticism of bureaucratic life that they make possible. The humanities, then, are indispensible to a free technological society because they can help us gain the foresight and wisdom to reinvest our goods toward a more adequate image of the good life.--Patrick D. Hazard, "Think of Taste Before Taxes," Readings in Economics and Politics, ed. H.C. Harlan (New York, 1961), p. 725.

Where emphasis is placed on facts, education strives for a handbook knowledge, imparted to the student through surveys, profiles, graphs, and statistics of the subject matter. True education is incompatible with this kind of knowledge and with this method of instruction, for the crude empiricism into which such training has fallen is a purely mechanical piling up of facts. The training lays no foundation, it contains no forming principle, which would be superior to, and would master, the subject matter.--Friedrich Georg Juenger, The Failure of Technology (Chicago, 1956), pp. 99-100. Used by permission of the publisher, Henry Regnery Company.

By now technology has become as much a part of life as metabolism. The task therefore is to educate contemporary man as an "integrator," the new "designer" able to re-evaluate human needs warped by machine civilization....An education which is responsible for such a totality must be indivisible, integrating elements of art, science and technology.--Laszlo Moholy-Nagy, Vision in Motion (Chicago, 1956), p. 64. Used by permission of the publisher, Paul Theobold and Company.

The rise of modern science has had a tremendous impact on contemporary music and art, but the autonomy of artistic activities is fairly general throughout the history of Western culture. Nevertheless, the effect of science and technology on culture has been substantial. The effect of science, for example, on poetry has been to drive it out of the area of fact and into the area of ambiguity and ellipsis, simply because fact is handled so much better by science.--Daniel Bell, "The Post-Industrial Society," Technology and Social Change, ed. Eli Ginzberg (New York, 1964), p. 58. Used by permission of the publisher, the Columbia University Press.

Existentialism, modern art, and the theater of the absurd probably could not have come into being had not the control of the physical environment made possible that kind of work in which man's encounter with man, rather than the drudgery of work and meniality, become background for the human condition. --Charles R. DeCarlo, "Perspectives on Technology," Technology and Social Change, ed. Eli Ginzberg (New York, 1964), p. 12. Used by permission of the publisher, Columbia University Press.

If we desire to preserve man's freedom, dignity, and responsibility, it is precluded to act upon him by technical means, like psychology, and so forth. To transform man into a reasonable being and a good exploiter of techniques through certain psychological procedures is precisely to destroy him as a spiritual and ethical subject.--Jacques Ellul, "The Technological Order," Technology and Culture (Fall, 1962), p. 409.

Education is both the root of technological change and the basis for successful adaptation. We must become a more versatile people, with more skills and broader understanding of the modern world. A new national attitude, in which education is universally prized and innovation universally welcomed, is the key to the progress of the American people in the age of automation.--"Final Report of the Twenty-first American Assembly," Automation and Technological Change (Englewood Cliffs, N.J., 1962), p. 175.

It is no longer sufficient to tell a person what he should think--what theories have already been developed--he must be taught how to think so that he can make sense of an altering world and plan a sensible course of action whatever the conditions. This will require a revolution in education, but this drastic change must take place.--Robert Theobald, The Challenge of Abundance (New York, 1961), p. 105.

We need a view of the relations of art and society that reasserts the scale of the human individual as a measure of the social consciousness. Art is supremely the realization of the individual human scale within and against the social scale. Art, working from the human individual scale, depicts the relation of the individual to the given society.--Stephen Spender, "Social Purpose and the Integrity of the Artist," The Humanist Frame, ed. Julian Huxley (London, 1961), p. 232. Used by permission of Mr. Spender.

The cultivation of the arts is an education of the sensibilities, and if we are not given an education of this kind, if our hands remain empty and our perception of form is unexercised, then in idleness and vacancy we revert to violence and crime. When there is no will to creation the death instinct takes over and wills endless, gratuitous destruction.--Sir Herbert Read, "Art and Life," The Saturday Evening Post (September 26, 1959), p. 106.

For most of man's history, the term "humanistic" was used to distinguish what was human from what was brutal and coarse, or animal. The presence of technology separated man from the animal, and the degree of the rational control over nature distinguished the savage from the civilized man. But now we find that "humanist" is increasingly juxtaposed with "technology" and "humanistic" is used to distinguish everything else from science and technology. Indeed, the word "humanist" has almost become equated with an arrogant ignorance of science and technology, and the humanities have become the home of anti-rationalists who deny that rational attempts to deal with human material wants have any bearing upon man's civilized pursuit of "the good life." --Melvin Kranzberg, "Technology and Human Values," Virginia Quarterly Review (Autumn, 1964), p. 579.

I believe that science can create values; and will create them, just as literature does, by looking into the human personality; by discovering what divides it and what cements it. That is how great writers have explored man. The insight of science is not different from that of the arts. Science will create values, I believe, and discover virtues, when it looks into man; when it explores what makes him man and not an animal, and what makes his societies human and not animal packs.--J. Bronowski, "A Letter to Posterity," AAUW Journal (May, 1963), p. 165.

The humanities can help us see life in its wholeness....In a humanistic context, the purpose of learning is to understand the place of man in the vaster design, to provide some abiding place for the mind, some habitation for the spirit. In a humanistic spirit man must have a view of the ends to which life should be directed and the principles by which it should be lived. He should be able to see phenomena in context. He has facts, he should have a way of looking at them, and then must be moved to do something about them.--Luther H. Harshbarger, "Humanistic Imperatives and Technological Change," The Educational Forum (March, 1965), p. 315.

Science interprets the phenomenal world with reference to the coherences to structure and behavior. Art transforms the phenomenal world into poetic metaphors with reference to experiences unique to man. Both are indispensable to the enrichment of life in our civilization, and each can only benefit from a mature reciprocity with the other.--Jules Langsner, "The Artist and the Scientist," Arts and Architecture (August, 1962), p. 15. Mr. Langsner's essay was completed under a Fellowship grant from the Graham Foundation for Advanced Studies in the Fine Arts, Chicago 10, Illinois.

Today's secular disruption between the creative aspect of art and that of science is a barbarism that would have brought lifted eyebrows in a Cro-Magnon cave. It is a product of high technical specialization, the deliberate blunting of wonder, and the equally deliberate suppression of a phase of our humanity in the name of an authoritarian institution: science, which has taken on, in our time, curious puritanical overtones.--Loren Eiseley, "The Illusion of the Two Cultures," The American Scholar (Summer, 1964), pp. 391-392.

C. The Uses and Abuses of Leisure

Increasingly it is in our leisure time that either the meaningfulness or the pointlessness of life will be revealed. Leisure today may be a challenge or a threat, a hazard or an opportunity, a vice or a virtue, a bane or a blessing. Whether it will be a boring nuisance or an unmatched opportunity may well depend upon the perspectives and resources we bring to bear upon the problem. The choice before us is clear: a new age of leisure or a new barbarism.--Robert Lee, Religion and Leisure in America (New York, 1964), p. 26. Used by permission of the publisher, Abingdon Press.

The creations of a hobby rarely rise to even the lower levels of taste of beauty, and it is not required of them that they should. To keep occupied, whether in Sunday painting or at a cellar lathe, is more important to the hobbyist than to keep alive. And merely to be occupied is, needless to say, the explicit denial of leisure.--August Heckscher, The Public Happiness (New York, 1962), p. 158. Used by permission of Atheneum, the publisher.

....The leisure department should be staffed to serve all interests in society and should constantly strive to give the pertinent public something a little better or more sophisticated than it presently wants. Patronizing is to be avoided, but the department should never be happy to "give the people what they want." Most people do not know what they want, when it comes to developing their intellects, their personalities and their bodies. They should be encouraged or compelled to learn to like things they presently dislike.--James C. Charlesworth, "A Comprehensive Plan for the Wise Use of Leisure," Leisure in America: Blessing or Curse? ed. James C. Charlesworth (Philadelphia, 1964), p. 41. Used by permission of the publisher, the American Academy of Political and Social Science.

It is possible to be freed from the pressures of daily life and still not have a leisure time. This occurs when one has no interest in leisure, no ability to make use of the free time, is subject to conditions which are not propitious, or lacks the facilities which enable him to express his interests, make use of his abilities, and take advantage of the conditions.--Paul Weiss, "A Philosophical Definition of Leisure," Leisure in America: Blessing or Curse?, ed. James C. Charlesworth (Philadelphia, 1964), p. 24. Used by permission of the publisher, the American Academy of Political and Social Science.

The more free time a man has, the less free, very often, he himself is. He has commitments in a hundred different directions, and none of them really seem to engage his full interest or to satisfy his deepest desires. He feels distracted rather than at peace; and in the end he may well flee to the solace of work, which at least gives him the sense of a wholeness of preoccupation and may even, in the nooks and crannies of its routine, leave him space for thoughts of his own.--August Heckscher, The Public Happiness (New York, 1962), p. 160. Used by permission of Atheneum, the publisher.

Leisure time, paradoxically, can be best used only if some leisure time is used up in the preparation of a man for leisure. The awareness, for example, that man's interests need awakening, refinement, expansion, and direction points up the necessity for an educational program. That program involves an incursion into available leisure time. Similarly, men need training and opportunity to exercise their powers before they are able to have abilities for making profitable use of leisure time. Men are then once again required to use up some of their leisure time getting ready to use leisure time. Such preparation is work; it serves to meet necessary demands for a life of a certain kind. If the preparations are extensive, one will end with the paradox that all one's leisure time will be used up getting ready for more effective use of leisure time. The escape from this difficulty is, obviously, to have a good deal of the educating and training provided early in life and to envisage ways of making use of leisure time which will require little education and training beyond that provided during school days.--Paul Weiss, "A Philosophical Definition of Leisure," Leisure in America: Blessing or Curse?, ed. James C. Charlesworth (Philadelphia, 1964), pp. 25-26. Used by permission of the publisher, the American Academy of Political and Social Science.

To Americans' other problems has been added the problem of free time. If they fail in meeting this imaginatively and effectively, their whole civilization will suffer. If they succeed, they will have a key which opens other doors and may in the end permit them to make sense out of the world as it is. --August Heckscher, The Public Happiness (New York, 1962), p. 152. Used by permission of Atheneum, the publisher.

The theology of leisure begins with a knowledge of man and asks: How will man pass the time in any other way than in becoming himself? Becoming himself is not an individualistic or egoistic program, for it projects the self outwards toward nature, other human beings, and God, and also into history of which it is a necessary, though transitional, element.--Emile Rideau, S.J., "Theology of Leisure," Theology Digest (Autumn, 1964), p. 188.

Automation will accelerate the development of a new leisure class. Far from being an aristocratic elite, it will be democratic in composition and temper. The reduction in hours of work and in physical arduousness has already proceeded more rapidly than the maturation of a constructive philosophy of leisure for the working man. Increased longevity has accentuated the effects of that deficiency. With the increasing time to himself, man is more than ever in need of improved taste, more diversified interests, higher individual ideals. It is essential to develop a theory of leisure as the basis for genuine personal enrichment. The attainment of that goal will call for self-discipline at least as rigorous as has been demanded by arduous labor in the past.--Henry M. Wriston, "Perspective," Automation and Technological Change, ed. John T. Dunlop (New York, 1962), p. 172. Copyright by The American Assembly, Columbia University, New York, New York. Reprinted by permission of Prentice-Hall, Inc., the publisher.

In our zeal for providing adequate leisure-time opportunities through governmental programs, we may overemphasize the governmental role and greatly diminish the creative contributions that flow from private and volunteer groups. Yet, if the government role is not to be all-embracing and pervasive, government is undoubtedly the institution best equipped to assume the responsibilities of organization and leadership. It is probable that only public agencies can supply on a comprehensive and adequate scale the necessary resources, both fiscal and human, to embark on programs which will have significant effects on large segments of our population.--Thomas J. Davy and Lloyd A. Rowe, "Precis of the Conference," Leisure in America: Blessing or Curse?, ed. James C. Charlesworth (Philadelphia, 1964), pp. 86-87. Used by permission of the publisher, the American Academy of Political and Social Science.

D. Education for Orderly, Free and Human Change

The long-range stability of the social system depends on a population of young people properly educated to enter the adult world of tasks and attitudes. Once, the pace of change was slow enough to permit a comfortable margin of compatibility between the adult world and the one children were trained to expect. This compatibility no longer exists. Now we have to ask: What should be the education of a population more and more enveloped in cybernation? What are the appropriate attitudes toward training for participation in government, the use of leisure, standards of consumption, particular occupations?--Donald N. Michael, Cybernation: The Silent Conquest, a report to the Center for Study of Democratic Institutions, (Santa Barbara, California, 1962), p. 41.

Education is a mechanism for inducing change and for providing the means of accommodation and adjustment to change. At the same time, as an institution, education is given responsibility for insuring the preservation and transfer and therefore the continuity of the society's knowledge, skills, traditions and values.--Luther H. Evans and George E. Arnstein, eds. Automation and the Challenge to Education: Proceedings of a Symposium, National Education Association (Washington, D.C., 1962), pp. 1-2. The editors make use of the ideas of Henry David most recently published in Manpower Policies for a Democratic Society (New York, 1965), p. 65.

Man in the future world community will increasingly base his thoughts and actions on a view of nature, of himself, and of his works arising from the findings of science. Youths will be taught, with copious examples, the dire consequences of wishful, 'rationalized' thinking, of uncritical following of authority, and of allowing symbols to mask the realities that are supposed to be represented. They will be trained in the evaluation of evidence in varied fields, in the designing of texts, in the criticism of the methods and conclusions of their own and others, and so far as it may be open to them, in creative thinking applied in diverse directions. At the same time they will be taught, both in its grand outlines and in the form of specific, vivid illustrations, what kind of a world they live in, how it operates, how it has come about and is still changing, man's nature and possibilities, and their own roles as active participants in the human enterprise. These teachings will be presented not as dogmas but with an appraisal of the grounds for them and for the evolutionary view of things in general.--H.J. Muller, "The Human Future," *The Humanist Frame*, ed. Julian Huxley (New York, 1961), pp. 407-408.

What is the task of the liberal college for adults?.... Its first and continuing task is to help develop the bold and sensible individual who cannot be overwhelmed by the burdens of modern life....What the college ought to do for the individual is to turn personal troubles and concerns into social issues and rationally open problems....the task is to help him become a self-educating man.--C. Wright Mills, *Power, Politics and People* (New York, 1963), pp. 367-368. Used by permission of the publisher, Oxford University Press.

We are going to be completely unemployed as muscle-working machines. *We as economic society are going to have to pay our whole population to go to school and pay it to stay at school.* That is, we are going to have to put our whole population into the educational process and get everybody realistically literate in many directions. Quite clearly, *the new political word* is going to be *investment*. It is not going to be *dole* or socialism, or the idea of people hanging around in bread lines. The new popular *regenerative investment* idea is actually that of making people more familiar with the patterns of the universe, that is, with what man has learned about the universe to date, and that of getting everybody inter-communicative at every higher levels of literacy. People are then going to stay in the education process. They are going to populate ever-increasing numbers of research laboratories and universities.--R. Buckminster Fuller, *Education Automation* (Carbondale, Illinois, 1962), pp. 46-47. Used by permission of the publisher, Southern Illinois University Press.

The antithesis between a technical and a liberal education is fallacious. There can be no adequate education which is not liberal, and no liberal education which is not technical: that is, no education which does not impart both technique and intellectual vision. --Alfred North Whitehead, *The Aims of Education* (New York, 1929), p. 56.

It is now plain that only by restoring the human personality to the center of our scheme of thought can mechanization and automation be brought back into the service of life. Until this happens in education, there is not a single advance in science, from the release of nuclear energy to the isolation of DNA in genetic inheritance, that may not, because of our literally absentminded automatism in applying it, bring on disastrous consequences to the human race. These consequences would have no parallel in previous history, since in both cases they would be irreversible and irretrievable. For that possible miscarriage, our educational institutions would have to take no small share of the blame.--Lewis Mumford, "Automation of Knowledge," Current Issues in Higher Education (1964), p. 17.

It should be our business in higher technological education to persuade students that they cannot practice technology without continually reflecting upon its social implications, and that some understanding of the humanities is essential to this reflection.--Sir Eric Ashby, "Technological Humanism," Journal of the Institute of Metals, LXXXV (1957), pp. 465-466.

In the past, educators could plan reasonably well to prepare the student for a lifetime career as a clerk, factory worker, mechanical engineer, or salesman. Most jobs and the qualifications were fairly constant. For example, the likelihood of radical change being required of a machinist or clerk was remote. New types of jobs were quite rare and generally involved very few people. Today this is no longer true. Educators at all levels now realize that education must enable graduates to undertake later career changes and be flexible enough to meet them successfully. Education and reeducation must be a continuing process throughout the careers of most young people in school today. The range of problems facing them in the next ten years, in economics, space science, automation, life science, and almost every other field will demand far more open minds, and far better trained ones, than ever before in man's history.--Thomas J. Watson, Jr., "Technological Change," Of Men and Machines, ed. Arthur O. Lewis, Jr. (New York, 1963), pp. 302-303.

In its essence a liberal education is an education for thought and for aesthetic appreciation. It proceeds by imparting a knowledge of the masterpieces of thought, of imaginative literature, and of art. The action which it contemplates is command. It is an aristocratic education implying leisure.--Alfred North Whitehead, The Aims of Education (New York, 1929), pp. 53-54.

Learning should be a lifelong, conscious activity and... failure to educate in terms of new developments can only mean unemployment and social disorientation. Vocational education has been slow in adapting to changing needs, operating largely within the boundaries of concepts formulated around the time of World War I. Only recently has it begun to receive even a measure of the attention it sorely needs. Adult education, as traditionally carried on, must be broadened and many of its former concerns modified. It must assume a much greater role in updating skills and prompting continuing learning. The notion of refresher or extension courses, so well accepted in many professions, must become a routine course of action for people in industry and government and must be applied to workers in the lowest as well as in the highest echelons. Further, there is a great need for better facilities for counseling, guidance, and placement at the adult level.--Luther H. Evans and George E. Arnstein, eds., *Automation and the Challenge to Education: Proceedings of a Symposium*, National Education Association (Washington, D.C., 1962), pp. 6-7.

TOWARD A BIBLIOGRAPHY
ON
TECHNOLOGICAL CHANGE, HUMAN VALUES, AND THE HUMANITIES

The Bibliography that follows is neither critical nor complete. To make it a critical compilation would delay publication to the point of fast-diminishing usefulness. To try to make it complete would indefinitely postpone such publication. Newly produced and relevant materials--all the way from fugitive pieces in the daily press to solid tomes--constitute a veritable Niagara. Even as the present listings are being typed, other relevant items, like the fabled dragons' teeth, are springing up all about us.

This compilation, then, is offered as a contribution--hopefully of wide usefulness--to the accumulation of resources for those working in the vast, heterogeneous, and ramifying concerns of technological change, the humanities, and human values. Hopefully, it will provide a substantial store to which each user may add his own personal augmentations.

The classification scheme adopted for this Bibliography must similarly be regarded as tentative and as yet not solidified. The compilers would have no quarrel with those who, for this or that item, would prefer a different classification. They realize, moreover, that the several categories in the classification overlap--that they are by no means mutually exclusive.

Here, too, however, it has been felt that it is much better to attempt some tentative classification--to help bring at least a semblance of order out of chaos, rather than to delay until a pure and definitive system might be worked out. Here, too, the hope has been to make certain resources available, now, while the need is urgent, rather than to wait and produce a definitive work, which would then turn out to be largely of historical rather than immediately functional worth.

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CLASSIFICATION SCHEME

BIBLIOGRAPHY

Two circumstances make the classification particularly difficult: (1) considerable overlap in the meanings of key terms--e.g.: science, technology, cybernetics, cybernation, automation; (2) the numerous interrelationships among the several categories.

I. Background and Context

   A. Social and Economic Change
   B. The Two Cultures?
   C. Values and Ideals
   D. Science and Human Values

II. Impacts and Implications

   A. Technology and Human Values
   B. Computers, Cybernation, the Electronic Revolution
   C. Impact of Automation
   D. Automation and Leisure
   E. Educational Implications
   F. Humanities, Arts, and Letters
   G. Futurism and the Futurists

III. Further Resources

   A. CCLE-IBM Humanities Project Publications and Reprints
   B. CCLE-Humanities Study-Discussion Programs related to Technological Change and Human Values
   C. Bibliographic Resources
   D. Collections

I. BACKGROUND AND CONTEXT

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